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TROPICAL DISEASES BULLETIN

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 37.] 1940. [No. 3.

SUMMARY OF RECENT ABSTRACTS.*

III. MALARIA.

Epidemiology.

General.—Malaria surveys are reported from Algeria (p. 388), Eritrea (p. 488), Abyssinia (p. 677), Italian Somaliland (p. 678), Tanganyika (pp. 126, 387), Lourenço Marques (p. 488), the Belgian Congo (pp. 777, 778), the Bahrein Islands (p. 678), Kutch State (p. 9), Manbhum (p. 9), the Madras Presidency (p. 131), Tonking (p. 131), Saigon (p. 679), Laos (p. 389), the New Hebrides (p. 918), the Philippines (p. 8) and British Guiana (p. 809). Relevant parts of these are abstracted below but those interested in methods used and results obtained in surveys as a whole should refer to the pages noted.

With reference to the study of epidemiological conditions, DECOURT (p. 818) states that splenic, splenometric and parasite indexes should be recorded in adults as well as children. The incidence of febrile attacks, mortality, still-births and the effects of morbidity on social and economic life should be studied, and serometric indexes may give valuable immunological information. SCHÜFFNER (p. 129) in a paper first published in 1919, also stresses the importance of recording the degree of splenic enlargement in estimations of spleen rates, and of the inclusion of adults in such surveys. Thus carried out, spleen rates give invaluable information, but blood examinations are also necessary.

RUSSELL (p. 787) shows how the failure to integrate in practice the knowledge of the problems of irrigation and those of malaria in India has led to the increasing incidence of malaria due to irrigation schemes. But he points out that it is *defective* irrigation which is at fault and gives a list of common practices which lead to the production of malaria. Of these, perhaps the most important are the absence of drainage canals and general untidiness through neglect of proper maintenance and planning of canals and channels. Subsoil water has in places risen greatly through the effects of barrage construction. SWEET (p. 808) points out that in Mysore minor irrigation from tanks which depend on rainfall produces little or no malaria. Larger

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin*, 1939, Vol. 36. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

projects from tanks which never go dry and from which a system of canals is led are often associated with malaria of some severity. Extensive river irrigation is invariably responsible for much malaria.

KINGSBURY (p. 128) refers to the part played by meteorological conditions, the replanting of rubber and the immigration of large numbers of non-immune labourers in the epidemiology of malaria on estates in Malaya.

PINTO (p. 1006) shows how the introduction of *A. gambiae* into S. America in 1928–1930 was followed by a local epidemic, and that in 1938 there occurred a widespread epidemic throughout the greater part of N. Brazil in which the deaths were estimated at more than 20,000. He (p. 680) reports a case mortality of 6 to 15 per cent. Ships were probably responsible for the introduction of *A. gambiae* from W. Africa, but its further spread may be effected by aircraft.

Distribution.—TANGUY (p. 917) records the case of a woman and her husband who contracted malaria in France near Fréjus.

In central Russia SARIKJAN (p. 677) reports that the majority of primary attacks in infants occur in the first half of the year, more especially in the second quarter. This is probably attributable to the large proportion of cases with prolonged incubation periods or to infection from mosquitoes which have been hibernating.

SCHWETZ and BAUMANN (p. 777) found that at Coquilhatville on the river Congo, the degree of infection of children was low and that of adults higher, an unusual finding in the Congo. Malaria is only very feebly endemic and although mosquitoes are numerous *A. gambiae* was not found. On the other hand SCHWETZ and GERONNEZ (p. 777) found the high infection rate of 95·8 per cent. in children at Luozi on the river Congo, with a spleen rate of 78·9 per cent. In two other areas away from the river and at an altitude of 750–800 metres the rates were considerably lower. Similarly they (p. 778) found very high rates in three other riverside places (where *A. gambiae* was common) but low rates in a district on a plateau where anophelines are rare. These investigations were made in the dry season.

RUSSELL (p. 130) found 55·5 per cent. infections (by examination of a single smear) and 41·5 per cent. spleen rate in infants in Ashanti.

In Dar es Salaam MACKAY (p. 387) reports spleen rates of 88·2 for ages 0–5, and 79·4 for ages 6–10. The infection rate is fairly constant throughout the year and the trend of the graph of parasites per cmm. blood follows closely that of the infection rate of Anopheles.

CORRADETTI (p. 677) states that in the Lake Tsana region of Abyssinia areas over 2,000 metres above sea level are free from malaria throughout the year, but at lower levels malaria occurs during and after the rains.

In the Bahrein Islands of the Persian Gulf AFRIDI and MAJID (p. 678) found malaria to be responsible for nearly one-quarter of the cases treated at the Manama hospital. The spleen rate in children in Manama was 38·9. The average annual rainfall is only 3¼ inches, but there are copious springs of slightly brackish water.

In part of the Madras Presidency RUSSELL *et al.* (p. 131) found significantly greater spleen and parasite indexes in boys than in girls.

In Laos LEFEBVRE (p. 389) reports that malaria prevails everywhere without intermission and with little seasonal or annual variation. Epidemics are practically unknown, but hospital returns indicate that during the rains there is increased prevalence. Spleen and parasite rates in children of 60–90 per cent. have been recorded in some places but the average rates were 59 and 43 per cent. GENEVRAY *et al.*

(p. 131) show that malaria is as hyperendemic in certain restricted parts of the low-lying parts of Tonking as in the mountains, and that it is with difficulty that Annamese labour can be acclimatized to the conditions. FARINAUD *et al.* (p. 679) show that the town of Saigon-Cholon is an area of extremely low endemicity but there are undoubted foci of malaria and seasonal or sporadic outbreaks occur.

On the coast of British Guiana GIGLIOLI (p. 809) reports that epidemic conditions occur in connexion with excessive rainfall which provides breeding facilities and the high atmospheric humidity favourable to *A. darlingi*.

Aetiology.

KIKUTH (p. 817) states that a stage of development between sporozoites and intracellular forms has been suggested to explain long incubation periods, relapses and the inactivity of drugs as causal prophylactics. In inoculation malaria this stage is absent, and small doses of drugs serve for cure.

CHRISTOPHERS and SINTON (p. 390) review the nomenclature of the malaria parasites and show how the names *P. vivax* (Grassi and Feletti), *P. malariae* (Grassi and Feletti) and *P. falciparum* (Welch) are justified. MISSIROLI (p. 919) on the other hand names the malignant tertian parasite *P. immaculatum* (Grassi and Feletti, 1892) with *P. falciparum* as a synonym. ZIEMANN (p. 133) differentiates a form of *P. falciparum* which he proposes to name *P. falciparum* subsp. *P. perniciosum*. This has marked virulence and distinctive morphological and biological characters. It has been found in the Cameroons and in Ethiopia. GIOVANNOLA (p. 919) also differentiates between the Ethiopian and Roman strains of *P. falciparum* and names the former *P. immaculatum* var. *perniciosum* (Ziemann, 1915).

WILSON (p. 677) describes morphological differences in *P. falciparum* in the blood of immune and non-immune persons in East Africa. In the former the parasites are polymorphic, in the latter almost monomorphic.

In Laos LEFEBVRE (p. 389) finds that splenic enlargement is less pronounced in *P. vivax* than in *P. falciparum* and *P. malariae* carriers.

BOYD and MATTHEWS (p. 781) show that the McCoy strain of *P. vivax* has maintained its original antigenic identity for more than 6 years in the course of 40 passages through man and Anopheles. CIUCA *et al.* (p. 390) in a long series of experiments similarly found that the maintenance of a local strain of *P. vivax* in patients in a non-endemic country did not bring about any change in the strain.

ZIEMANN (p. 133) discusses *P. ovale* and decides against the species nature of this parasite on the ground that there is no region in which it is found exclusively and that in inoculation experiments reversal to *P. vivax* has been observed. In comment FULTON briefly indicates the strong arguments on which the specific nature of *P. ovale* is based.

SHIEBER (p. 809) reports the first discovery of *P. ovale* in Palestine. SCHWETZ (p. 808) found *P. ovale* in the blood of several native children in the Congo suffering from afebrile endemic malaria. The presence of schizonts of *P. falciparum* in children was similarly not necessarily associated with illness. BLAIR (p. 133) reports eight cases of infection with *P. ovale* in S. Rhodesia, all from a limited area. Both *P. vivax* and *P. malariae*, usually uncommon in S. Rhodesia, were found in the same district.

In experimental infection of patients with *P. vivax* and *P. malariae* simultaneously, MAYNE and YOUNG (p. 139) show that there is an apparent antagonism of one species against another and they conclude that mixed infections are probably more common in nature than is supposed.

In Freetown, Sierra Leone, PEASTON and RENNER (p. 926) found a remarkable predominance of *P. malariae*. In the New Hebrides HÉRIVAUX *et al.* (p. 918) note that *P. malariae* was not seen during their survey.

P. knowlesi was found by MILAM and KUSCH (p. 140) to have a limited value in induced malaria in man. The course of the infection is generally mild and though relapses may occur it tends to die out spontaneously.

Transmission.

HUFF (p. 8) argues that the life-cycle of malaria involves three kinds of animals : parasite, mosquito and man, all of which are bisexual and therefore probably undergoing genetic change. He has previously shown that susceptibility to the parasite of avian malaria is an inherent characteristic of the individual mosquito, transmitted in simple Mendelian fashion. If this is true of Anopheles it might be possible for a mosquito population to change from a low to a high degree of susceptibility, or *vice versa*. Immunological differences in strains of Plasmodia may similarly be genetic in character. [For the original work on which these speculations are based see this *Bulletin*, 1930, Vol. 27, p. 892 ; 1931, Vol. 28, p. 507 ; 1932, Vol. 29, p. 126, 703 ; 1934, Vol. 31, p. 464 ; 1936, Vol. 33, p. 237.]

SINTON AND SHUTE (p. 15) support the view that malaria parasites are harmless to Anopheles if the latter are maintained under favourable conditions, but if the conditions are unfavourable infection tends to shorten life. Their experiments are quoted and they conclude that it is not death from infection which is mainly responsible for the fact that certain species of Anopheles seldom transmit malaria in nature.

WEYER and BOCK (p. 920) point out that for good mosquito infections the number of gametocytes in the blood is important and the increase in the number of human passages affects these adversely. They consider that there is a higher mortality in mosquitoes heavily infected. *A. maculipennis* transmits *P. vivax* better than it does *P. falciparum*, and *A. superpictus* is the best transmitter (of those tested) of the latter.

ROY (p. 336) found that in emulsions of salivary glands, when further dilutions were made, no proportionate relationship between the numbers of sporozoites and the dilution could be found. He attributes this to the tendency of the sporozoites to adhere to the wall of the glass utensil used and argues that an emulsion leaving a syringe may contain a considerably smaller number of sporozoites than the estimated dose.

WEATHERSBEE and HASELL (p. 137) describe their method of staining larvae in dilute solution (1/250) of Giemsa's stain for long periods (3 days). Adults emerging from these are unmistakably stained and may remain so for periods up to 39 days.

CAMBOURNAC (p. 920) describes a method for determining the larval anopheline population and its distribution in rice fields in Portugal.

The relationship between salinity and breeding of races of *A. maculipennis* is discussed by several authors. DE BUCK (p. 489) finds in

Holland that *A. maculipennis atroparvus* and *A. m. messeae* are not sharply separated from each other according to the salinity of the water. The latter will lay eggs in brackish water, and *atroparvus* in fresh water in which a high larval mortality will occur. From experimental work VAN THIEL (p. 489) concludes that even if water in N. Holland were rendered fresh, *A. maculipennis messeae* would not displace *atroparvus*. The coastal distribution of *A. maculipennis atroparvus* in Sweden and Germany is pointed out by EKBLOM (p. 134) and WEYER (p. 134), but they emphasize that the relation of larva to salinity is not a simple one.

In a discussion on malaria in Holland the Malaria Commission (p. 402) point out that infected Anopheles are only found in late summer and autumn, almost exclusively in dwellings, but that only *A. maculipennis atroparvus* continues to suck human blood in late summer. Anopheles infection in late summer and autumn is restricted to a comparatively small number of houses, which become centres of infection, and from these Anopheles spread infection up to the end of October to neighbouring houses up to a radius of not more than 100 metres. About four-fifths of the persons who in a given year suffer from malaria live at most 100 metres distant from a centre of infection which had existed in the previous summer and autumn.

SHUTE and UNGUREANU (p. 810) found that a greater proportion of *A. maculipennis atroparvus* than of other races lives long enough to become infective, and that the average *atroparvus* would continue to be infective for a longer time than the average *messeae*.

VAN THIEL *et al.* (p. 1004) show that *A. maculipennis atroparvus* is definitely zoophilic and that the provision of pigsties near the houses in Holland is a valuable protective measure. The races *labranchiae* and *elutus* are definitely anthropophilic, but ROUBAUD (p. 919) shows that although *A. maculipennis labranchiae* is anthropophilic, and remains so for three generations when bred in captivity, certain individuals in lots bred together may display marked zoophilism, which appears to be constant.

SCHLENOVA (p. 490) describes the biological features of *A. maculipennis maculipennis*, the principal vector at Sotchi on the Black Sea. It is most prevalent in August and 20 per cent. of the engorged females examined contained human blood. *A. plumbeus* is second in importance as a vector. It is strongly zoophilic but attacks man. DANILOVA and BOUDYMKO (p. 491) describe the biology of *A. maculipennis* and *A. hyrcanus* near the sea of Azov. The former is the most important vector. SARIKJAN (p. 677) refers to the transmission of malaria in Central Russia during winter and spring by mosquitoes which have been hibernating.

LANGERON (p. 136) reports that *A. claviger* and *A. hispaniola* have been found breeding in grassy pools in the Atlas Mountains at 8,200 feet, in regions which are covered with snow for more than half the year. *P. vivax* malaria occurs in epidemic form.

A. pharoensis is the most prevalent Anopheles in Egypt and is a vector. It breeds in rice fields and explains the relationship between rice cultivation and malaria. *A. sergenti* is also probably a vector.

DE MEILLON (p. 135) has found larvae of *A. gambiae*, which usually prefers sunlit pools, in rainwater stored in total darkness in closed underground cisterns, and in an indoor water barrel in Mozambique. It may thus become a domestic breeder and the author suggests that

the species is kept alive in this way during the dry season until the preferred breeding places are available.

Malaria is only feebly endemic in Coquilhatville on the river Congo, and SCHWETZ and BAUMANN (p. 777) failed to find *A. gambiae* (otherwise almost ubiquitous in the Congo) there although other mosquitoes were numerous, including *A. marshalli* var. *moucheti*.

WILSON (p. 127) has investigated the relationship between length of wing and infectivity in *A. gambiae* in Tanganyika Territory. No significant conclusion was possible but the proportion of long winged individuals increases with a rise in atmospheric humidity and in three localities the higher the infectivity the larger was the proportion of long-winged insects. MACKAY (p. 387) shows that in Dar es Salaam *A. funestus* (which flourishes best in the dry season) is as important in transmission as *A. gambiae* (the infection rate of which follows the rainfall curve). *A. gambiae* var. *melas*, which has been found breeding in water with a saline content of 3,267 parts NaCl per 100,000, has not been found infected. WALKER (p. 137) reports that in Freetown, Sierra Leone, all stages of *A. gambiae* and *A. funestus*, especially the larvae, are frequently found to be infected with the fungus *Coleomyces africanus*, which causes a very high mortality in the larvae.

DE MEILLON (p. 135) found that *A. coustani* var. *tenebrosus* will attack man in the absence of cattle and considers that it may play a part in the propagation of winter malaria in S. Africa, when the normal vectors are inactive.

In the Bahrein Islands the only infected species found by AFRIDI and MAJID (p. 678) was *A. stephensi*.

Senior WHITE (p. 14) confirms previous work which indicated that in the Jeypore Hills *A. culicifacies* is of no pathogenic importance and that transmission is due to the *funestus* group *fluviatilis*, *varuna* and *minimus*. Anopheles control limited to this group has not led to any deterioration in health of the railway staff and has effected a 78 per cent. saving in expenditure on larvicides. *A. culicifacies* is similarly unimportant in the Singhbhum Hills (p. 14). Pigsties offer no attraction to the Anopheles of the Jeypore Hills. In the Tanjore District of the Madras Presidency RUSSELL *et al.* (p. 131) show that *A. culicifacies* is the only efficient vector, but is not an energetic one. It breeds in irrigation water.

ROY *et al.* (p. 681) call attention to the fact that *A. stephensi* is abundant in Calcutta and that, though a dangerous vector in other cities of India, it is not a carrier in Calcutta.

RUSSELL *et al.* (p. 1005) report the simultaneous natural infection of *A. subpictus* and *A. vagus* in Madras.

IYENGAR (p. 1005) shows that in the plains of Bengal *A. philippinensis* and in the foothills *A. minimus*, are the most important vectors. GENEVRAY *et al.* (p. 132) point out that in the lower hilly country of Tonking *A. minimus* is most prevalent in the dry season and found its rate of infection to be 6·45 per cent., a rate higher than that found in many parts of the mountainous region. *A. jeyporiensis*, *A. maculatus* and *A. vagus* are also dry season mosquitoes. Infection of *A. aconitus* was found but its zoophilic tendencies explain its unimportance as a vector. LEFEBVRE (p. 389) in Laos also notes that owing to the adaptability of its larval form *A. minimus* persists throughout the year. In certain places and at certain seasons *A. maculatus*, *A. jeyporiensis* and *A. leucosphyrus* are effective vectors.

KINGSBURY (p. 129) shows that in Malaya both *A. barbirostris* and *A. sundaicus* appear to have a marked preference for human blood. CHEDECAL (p. 779) shows how, in Hanoi, *A. vagus* and *A. hyrcanus* var. *sinensis* are strongly attracted to horses, and that this fact is useful in prophylaxis in the cavalry troops stationed there. In Saigon malaria is not common and FARINAUD *et al.* (p. 679) put forward the hypothesis that the enormous proliferation of *A. vagus*, an ineffectual vector, is responsible for the little transmission that does occur. No important vector is present in any considerable numbers.

In Tonking TOUMANOFF (p. 391) shows that *A. hyrcanus* var. *sinensis* does not actually hibernate but that the interval between feeding and egg-laying becomes extended up to over 100 days in winter. He (p. 810) shows that the evolution of malaria parasites in the vectors of Indo-China is sometimes slower than is generally thought, even at optimum temperatures.

In the New Hebrides HÉRIVAUX *et al.* (p. 918) found only *A. punctulatus*, which breeds in very diverse waters, but principally in relation to the rainy season.

A higher proportion of lots of *A. quadrimaculatus* was found by BOYD and KITCHEN (p. 492) to become infected to a rate of over 75 per cent. when fed on patients infected with *P. vivax* if exflagellation could be demonstrated than if it could not. Such a difference was not noted with *P. falciparum*.

GIGLIOLI (p. 809) concludes from his investigations that *A. darlingi* is the only important vector on the coast land of British Guiana. It is anthropophilic, unlike *A. tarsimaculatus* and *A. albitarsis*. Its breeding preferences are described.

In Temixco, which is highly malarious, *A. pseudopunctipennis* is the sole vector. VARGAS (p. 779) found that 33 per cent. preferred man to cow, and 27 per cent. preferred man to horse.

PINTO (p. 680) reports that *A. gambiae* in Brazil is spreading and breeding in many types of water. Sporozoite rates of 30 per cent. have been found.

Immunity and Pathology.

PARROT and CATANEI (p. 388) investigated the immune state of a highly infected population in Algeria. Premunition is established about the 10th year; it is less complete, less early and more ephemeral in *P. falciparum* than in *P. vivax* and *P. malariae* infections, and violent *P. falciparum* epidemics occur from time to time as the immunity wanes and if excessive breeding of Anopheles takes place. Gametocyte carriers in *P. falciparum* infections are 5 per cent. of the infected, but *P. vivax* carriers are 42·8 per cent. and *P. malariae* carriers 63·6 per cent. Old cases of the two latter are important reservoirs and epidemics occur but rarely.

WILSON (p. 676) in Tanganyika Territory compares the natural history of *P. falciparum* malaria in a continuously hyperendemic area with that in a district in which, though infection is heavy, it is more seasonal. In the former the high spleen rates, parasite rates and parasite counts in childhood fall considerably to adult life and there are no apparent ill effects due to malaria from late childhood onwards. Full immunity is acquired. In the latter the spleen rates and parasite rates decline but slightly with age and attacks of malaria occur in adults during the transmission season. Immunity is incomplete

because transmission is seasonal. He agrees that immunity to *P. falciparum* is very evanescent. He points out (p. 128) that the presence of a few parasites in the blood of a non-immune person means that he is suffering from malaria, but this is not so in an immune person. An immune person may suffer from heavy infection if he removes to another district, but its significance is not the same as that of a similar infection in a non-immune. CIUCA *et al.* (p. 390) conclude, from studies on induced malaria, that individuals are more susceptible to imported than to local strains of *P. vivax* and that those who have been infected with a local strain have a relative immunity towards an imported strain. These conclusions agree with those of WILSON concerning immunity to *P. falciparum*.

In a community in which the spleen and parasite rates diminish with age, SICAULT and MESSERLIN (p. 781) found the melano-flocculation serological index to increase. Of the inhabitants in an endemic area, in relatively good health, 44 per cent. showed neither enlarged spleens, parasites nor positive serological reactions, yet these persons were not more prone to malaria than the rest. The authors conclude therefore that, besides premunition, a true immunity not dependent upon the existence of parasites may be developed. DECOURT (p. 782) in a discussion of these views, considers that Henry's reaction may persist after the eradication of parasites. In addition to specific immunity he postulates a non-specific immunity connected with endothelial irritation by destruction products of parasites and red cells, especially melanin, and not dependent upon the presence of the parasite. The term immunition is employed to describe immunity following natural infection, and serological reactions afford evidence of this.

CICCHITTO (p. 678) found enlargement of the spleen to be most common in *P. vivax* infections in Somaliland. Very large spleens are rare in *P. falciparum* infections [but see LEFEBVRE above]. GIGLIOLI (p. 809) notes that splenic enlargement is much more marked and persistent among East Indians in British Guiana than among negroes living under exactly similar conditions.

Evidence of the long duration of immunity to homologous reinfection with *P. vivax* is quoted by BOYD and MATTHEWS (p. 780). Two patients were infected 7 years after primary infection, and though no evidence of persistence of the original infection could be found, the only evidence of reinfection was the appearance of a few parasites in the blood and (in one only) a single clinical attack.

BOYD *et al.* (p. 493) quote experimental work which indicates that simultaneous infection with two strains of *P. vivax* delays the development of homologous immunity to either. BOYD and KITCHEN (p. 922) have demonstrated experimentally the absence of cross immunity between *P. vivax* and *P. falciparum* infections.

KITCHEN (p. 138) found, in two cases of *P. vivax* infection, that the percentage of reticulocytes infected was much greater than that of adult red cells, that multiple infections were more numerous in the reticulocytes, and that in the later stages of the disease there was a marked increase in the number of reticulocytes. HINGST (p. 138), however, does not consider that the red cells are susceptible to infection only during the reticulocyte stage, as has been claimed. He points out that since sporulation takes place largely in restricted areas of the viscera or bone marrow, the percentages of infected reticulocytes and mature red cells in the peripheral blood are not reliable criteria of the conditions where sporulation occurs. Multiple infection of red cells

only occurs with certain strains of *P. vivax*, and Hingst considers that amitotic division is responsible.

Hegner (p. 495), from his own work, accepts the view that *P. vivax* has a special affinity for reticulocytes and in similar preparations finds that *P. falciparum* (and *P. knowlesi*) prefer to attack mature red cells. He concludes that the malignancy of these two parasites may be due to this property as well as to the rapidity of multiplication. *P. malariae* also shows a predilection for mature cells but its slow rate of multiplication renders it less malignant. Similarly Kitchen (p. 811) found that the total numbers of mature cells infected with *P. falciparum* constantly exceeded the total numbers of reticulocytes so infected, but there were variations in the percentages infected. In *P. malariae* infection reticulocytes were only rarely attacked.

Jolly and Danglemont (p. 782) consider that lack of resistance to *P. falciparum* allows extremely rapid multiplication with important destruction of parasites and red cells. Débris is so abundant that the phagocytes are unable to deal with it and this plays a part in determining pernicious attacks by mobilizing macrophages, which contribute to capillary embolism, and by blocking the kidneys with resulting uraemic symptoms.

Garnham (p. 492) examined the placentas of 500 native women in Kenya. Very large numbers of parasites may be found in the maternal blood spaces and a reticulo-endothelial response with phagocytosis of parasites is stimulated. He thinks that the origin of the macrophages may be the lymphocytes of the blood stream, as is the case with lymphocytes in the spleen. It is possible that relapses which follow parturition are due to the sudden removal with the placenta of a highly active reticulo-endothelial system. He was unable to demonstrate the passage of parasites from mother to foetus [see also Schwetz below]. On the other hand, infected red cells in the umbilical cord and elsewhere in the foetus were found by Garcia (p. 138) in post-mortem examinations of two pregnant women who died of cerebral malaria in the Philippines [see also below, *Clinical*].

In a search of local tissue and lymphatic glands after mosquito infection, Boyd and Kitchen (p. 811) found one extra-vascular sporozoite, and others in the connective tissue (not the lymphoid tissue) of the glands. This does not suggest that they travel usually by the lymph channels.

Clinical.

Boyd and Kitchen (p. 682) infer that if mosquitoes are applied to several subjects consecutively the number of sporozoites in their glands will gradually diminish. When 1–5 mosquitoes are used there are significant differences in the character of the infection experienced by the first and last patient of a series, the latter having longer incubation periods and shorter attacks. The duration of the attack following inoculation by a moderate number of mosquitoes tends to vary inversely with the duration of the incubation period and attacks of less than 8 days duration may be as significant of inadequate inoculation as of immunity. Similarly Sack (p. 139) reporting a case of *P. vivax* malaria in which the incubation period was between 11 and 12 months, inclines to the view that this may have been due to infection with a small number of parasites. Sioli *et al.* (p. 494), on the other hand, in describing the characters of infection with the Madagascar strain of *P. vivax*, note that there was no relation

between the number of mosquito bites and the incubation period or the character of the infection.

Boyd and Kitchen (p. 682) report an incubation period of 304 days in a patient infected with *P. vivax*. Jelinek (p. 496) describes incubation periods of 6 and 8 months in two patients with *P. vivax* infection. The latter patient showed symptoms suggesting cerebellar tumour which the author attributes to malarial thrombosis of a cerebral vein, which produced pressure symptoms, and to haemorrhages in the cerebellum itself. Germain and Morvan (p. 496) record an incubation period of at least 4½ months in a man who showed both *P. vivax* and *P. malariae* in his blood. Gardner and Dexter (p. 783) report that quartan malaria was contracted by a patient from a blood infusion the donor of which had suffered from the same type 17 years before, but had, since then, not had any attack of fever and and had lived in northern U.S.A. No parasites could be found in the blood of the donor.

Boyd (p. 495) has studied the parasite density in *P. vivax* malaria. A clinical reaction may be induced by a density of 10 per cmm., but at the end of the attack it was rarely less than 500. The final density bears no relation to that which provokes the original attack. Attacks provoked by trophozoite inoculation are commonly shorter than those due to sporozoites, possibly owing to more rapid immunization by reason of higher parasite densities. Sivalingam (p. 681), however, considers that about 900 parasites per cmm. are necessary to produce primary attacks of *P. vivax* malaria, but that 500 are sufficient in subsequent attacks.

Decourt (p. 782) notes that patients infected by injection of infected blood in non-malarial regions never relapse.

Boyd and Kitchen (p. 495) show that 3 of 7 patients infected simultaneously with *P. falciparum* and *P. vivax*, and in whom the first attack was characteristic of the former infection, had clinical attacks attributable to *P. vivax* in the following winter and spring.

Shute and Badenski (p. 393) point out the necessity for aborting primary attacks of *P. falciparum* malaria about the 10th day and that greater care is needed in the treatment of primary attacks than of relapses.

Melchior and Özkan (p. 1007) discuss the confusion which malaria may cause in the diagnosis of surgical conditions and its influence on surgical mortality. They do not favour splenectomy in malarial cachexia.

Carrot and Fabiani (p. 392) describe a syndrome of acute jaundice and acute pain in the upper abdomen in a patient with *P. falciparum* malaria. Subperitoneal haemorrhages were found post mortem and it is supposed that these were responsible for the pain.

Desnos and Abély (p. 142) describe acute and chronic forms of nephritis due to malaria. In patients therapeutically infected with *P. vivax* it is common for the blood urea to increase as the malaria progresses and it is important that the physician should watch the blood urea and renal function. Quinine is never contra-indicated in these cases. Sarrouy and Portier (p. 1007) report a case of fatty nephrosis in which renal function was unimpaired, and consider that *P. malariae* infection played an important part in the aetiology of this condition.

Strongly positive complement fixation reactions were found by Eaton and Coggeshall (p. 926) to be given by the sera of persons infected with *P. knowlesi*, *P. vivax* or *P. falciparum* when an antigen

prepared from the blood of monkeys infected with *P. knowlesi* was used. Controls were negative or only feebly positive. The reaction is therefore group specific rather than species specific. Azzi and Del Frade (p. 395) found that Kahn and Meinicke reactions may be positive in non-syphilitic children during an attack of malaria.

Chorine (p. 394) shows that the action of melanin in Henry's reaction is that of an indicator only. The chief rôle in the reaction is played by euglobulins and it is only positive when these form 32 per cent. or more of the serum proteins. Malarial euglobulins do not differ from those of normal serum. The reaction has undeniable clinical value, and becomes positive on the 3rd to 5th day after malaria inoculation. Sicault and Messerlin (p. 395) describe a method to determine the maximum dilution of serum which gives a positive melanoflocculation reaction.

Proske and Watson (p. 813) have devised a test for the quantitative estimation of the euglobulins in serum by means of a phenol reagent. This is easy to perform. The index for euglobulin fluctuates between 50 and 80 in normal sera but in malarial sera is from 80 to 280 or more. The test is no more specific than Henry's reaction but is positive in 97·4 per cent. of known cases of malaria and is therefore valuable.

Cicchitto (p. 392) has observed that a moderate or high degree of reticulocytosis occurs in malaria, especially in malarial anaemia, and is restored to normal by specific treatment. Manceaux (p. 812) details the changes in the leucocyte formula in acute malaria, the chief feature of which is monocytosis.

In a consideration of congenital malaria Schwetz (p. 783) concludes that the numerous undoubted cases have been incidents in acute malaria of the mother during pregnancy, and that usually *P. vivax* is responsible. In populations suffering from endemic, afebrile malaria the search for congenital malaria has been consistently negative in spite of the fact that *P. falciparum* may be present in the maternal blood [see also Garnham above]. The explanation of the difference is unknown. Green (p. 392) reports three cases of malaria in the new-born; none was more than two days old and parasites were found in all. Das Gupta (p. 1006) reports a heavy infection with an abnormal form of *P. vivax* in an infant 15 hours old. Measham (p. 393) reports malaria in a child 17 days old; as it was found in the non-transmitting season he regards it as a case of congenital malaria.

C. Wilcocks.

[*To be continued.*]

MALARIA.

Précis of Abstracts in this Section.

Christophers (p. 174) discusses malaria in war; it may be so important as to influence the result. Planning ahead is essential and arrangements for the provision of laboratories and for the supply of large quantities of Paris green, drugs and mosquito proofing materials should be made in good time. Quinine prophylaxis cannot be neglected. An effective advisory organization should be constituted which could operate at once should the war spread to malarious countries. In discussion, Perry describes army organization with regard to diagnosis facilities, Manifold shows that much has already been done to reduce

incidence in troops in Palestine and Egypt. JAMES considers that anti-larval methods have limited scope in war time and advises insecticidal sprays and prophylactic quinine. CASTELLANI (p. 175) attributes the relative freedom of the Italian troops in the Ethiopian campaign to rigidly enforced quinine prophylaxis of 0·6 gm. daily. Periodic urine tests were made to determine whether or not the quinine had been taken.

PIZZILLO (p. 176) considers that splemometric measurements should be related to anthropometric measurements to provide comparable indexes between individuals.

ZOTTA (p. 176) shows that in Rumania *A. maculipennis* is the only important vector. *P. vivax* is the commonest infection, *P. falciparum* only accounting for one-quarter of the cases. In many provinces endemicity is high. CROOK (p. 177) reports on malaria in Szechwan.

STRICKLAND *et al.* (p. 177) record the average interval between birth and the first attack of malaria in infants born in an endemic area in Bengal, according to season.

EARLE *et al.* (p. 178) made a very complete series of observations on 76 negro children in Porto Rico, involving sexual and asexual parasite counts in over 10,000 films, and clinical examinations. *P. falciparum* is the commonest infection, but all three plasmodia occur and mixed infections are frequent ; 41 of the 76 showed all three parasites at one time or another. They believe that the onset of a new infection can be determined and that each infection probably runs a definite course to natural cure. The highest parasite counts and the largest spleens were found within very few weeks after the onset of the first observed infections.

FAUST (p. 178) in a discussion of malaria in relation to life insurance policies states that in the southern U.S.A. the average annual incidence is about 4 per cent. of the population.

SERGENT *et al.* (p. 179) agree that the name *P. falciparum* should be adopted to designate the parasite of subtertian malaria.

KITCHEN (p. 179) finds that *P. falciparum* shows a lack of consistency in its tendency to be associated with erythrocytes of a given age group and that *P. malariae* is found most frequently in mature erythrocytes.

BATES (p. 179) records differences in the tolerance of various salts between larvae of six races of *A. maculipennis* and *A. superpictus*. MAROTTA and SANDICCHI (p. 180) describe infection of *A. maculipennis* var. *messeae* with *P. malariae*. VINOGRADSKAYA and TIMROT (p. 180) show that *A. superpictus* bred in the laboratory differ considerably from those observed in the field in behaviour and physiological condition.

HU (p. 181) describes observations on the time of exit of *A. hyrcanus* var. *sinensis* from houses in Shanghai.

FROHNE (p. 181) concludes tentatively that *A. quadrimaculatus* and *A. punctipennis* generally occur in waters poor in Desmids and *A. walkeri* in water rich in Desmids. BUXTON in comment points out the unsuitability of Desmids as indicator plants.

WILSON (p. 182) describes the differences in the immune state of East African tribes which are subject to continuous or to seasonal infection, conditions which depend on the continuous or seasonal breeding facilities for *A. gambiae*. In the former, treatment of children only is necessary ; in the latter it is required at all ages, but control of anopheline breeding may be practicable.

SINTON *et al.* (p. 183) show that *P. ovale* infection confers marked resistance to reinoculation with both homologous and heterologous strains, and that against the latter resistance is more effective than is the case with either *P. vivax* or *P. falciparum*.

From investigations in Greece MANDEKOS (p. 183) concludes that the general mortality in children harbouring parasites is no higher than in others, probably because the former receive more medical attention than the latter, and that infant mortality in malarious regions is not much influenced by economic status.

DAS GUPTA (p. 184) in discussing congenital malaria believes that the placental barrier is injured by chronic rather than by acute infection and that this may be the reason why in monkeys *P. knowlesi* is never found in the foetus.

GHIZZETTI (p. 184) describes a patient with signs of advanced pernicious anaemia and malaria; cure of both was effected with atebrin and plasmoquine. JAMES (p. 185) reports 22 cases of malarial nephritis in the Solomon Islands and New Guinea.

SANDERS and DAWSON (p. 185) report on the results of the five day treatment of malaria with 20 grains of quinine daily.

FARINAUD and ELICHE (p. 185) find that septasine is remarkably effective against malarial schizonts and against sexual forms of *P. vivax*, but has no action on gametocytes of *P. falciparum*, similarly CHOPRA *et al.* (p. 186) find that prontosil has a mild action in malaria, but not against gametocytes of *P. falciparum*.

To terminate therapeutic malaria CLEVELAND and TURVEY (p. 186) advocate a full course of mapharsen.

TOUMANOFF and HOANG-TICH-TRY (p. 187) observed in Hanoi that the infection rate of *A. minimus* was about the same whether the gametocyte rate was 10 or 40 per cent. Malaria prophylaxis cannot, therefore, in such places successfully be limited to medical measures.

AZIZ (p. 187) uses a suspension of Paris green in water for spraying in place of dusting. It is quite as efficient and is more economical and less dangerous to the personnel.

SERGENT (p. 187) has devised a method for preventing female Gambusia from eating their own young.

Bird and Monkey Malaria.—KIKUTH and MUDROW (p. 188) believe that only sporozoites or merozoites of exoerythrocytic schizonts (E. forms) of *P. cathemerium* and *P. relictum* give rise to exoerythrocytic schizonts and to pigmented parasites in the red cells; merozoites of the latter give rise only to other red cell forms. Quinine, atebrin and certuna were active against pigmented red cell forms but not against E. forms, but plasmoquine was active against E. forms as well.

BOYD and DUNN (p. 189) show in birds that quinine and plasmoquine act by reducing the rate of reproduction of *P. cathemerium* rather than by increasing normal destruction. This affords an explanation of why quinine fails to eradicate infection, but reduces it to a low level.

CHRISTOPHERS and FULTON (p. 190) describe a technique involving the use of saponin for obtaining parasites of *P. knowlesi* in a viable condition and entirely free from red cells.

SOMOGYI (p. 190) shows that serum from monkeys with chronic *P. knowlesi* infection will agglutinate infected red cells from other monkeys if 5–10 per cent. of these cells contain mature parasites.

SINGH and SINGH (p. 190) show that M. & B. 693 will cure *P. knowlesi* infection in monkeys. *C. W.*

CHRISTOPHERS (S. Rickard). **Malaria in War.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Nov. 25. Vol. 33. No. 3. pp. 277–292. With 3 maps & 1 fig. Discussion pp. 292–304 [WENYON (C. M.), PERRY (H. Marrian), MANIFOLD (J. A.), JAMES (S. P.), MANSON-BAHR (P.), WILLCOX (William) & WHITTINGHAM (H. E.)].

The choice of subject for this presidential address was prompted by current events. Its main theme concerns the measures that are necessary to safeguard the efficiency and welfare of troops should they be called upon to operate in regions in which malaria is endemic.

Though the aetiological fundamentals of " war malaria " differ in no essentials from those of malaria in a civil community at peace, the term is justified. Malaria in the past has influenced the results of wars ; the epidemiology of malaria in armies in the field may have special characteristics ; and the prevention and treatment of malaria in such conditions have special features.

The author refers to the incidence of malaria in past campaigns since the Napoleonic Wars but it is only from experience gained in certain campaigns of the Great War that information of much utility is forthcoming. Special reference is made to malaria in Taranto during the war as it affected British troops, to malaria in the Macedonian region, in the Mesopotamian campaign, in the East African campaign, and during the operations in Palestine. No mention is made of the malaria experience of allied or enemy forces.

Based on war experience the author discusses the various anti-malaria measures that were applied and their relative value. The discussion leads to the elaboration of the central idea of the address which is the necessity of planning ahead. A malaria laboratory would certainly be required to ascertain the conditions and to decide on and to supervise the measures to be taken ; this should be planned beforehand. The necessity of carrying out antilarval measures will almost certainly arise ; Paris green may be required on an enormous scale ; arrangements for this must be made in advance. Experience of quinine prophylaxis in the Great War was not encouraging but the author states that " we dare not neglect quinine prophylaxis." For this, too, plans must be made in advance. The supply of atebrin or atebrin substitutes must be arranged for. No reference is made to the probable extensive use of synthetic drug prophylaxis in future wars. Mosquito-proofed huts may be asked for and mosquito nets may have to be supplied. There must be hospital organization for the examination of blood films, necessitating the provision of microscopes, stains, slides and trained technicians ; this demands forethought.

If there is a probability that large bodies of troops may be employed in malarious areas an effective advisory organization for malaria should be constituted and its working established well ahead.

Discussion.—WENYON (C. M.) pointed out that since the last war much has been done by the Army Medical Services to apply modern knowledge to the prevention of malaria, notably in India and Palestine. In war the nature of anti-malaria measures is dependent upon the character of the expedition. Since the last war the introduction of Paris green as a larvicide has been an important innovation. Quinine prophylaxis does not prevent infection but it does prevent attacks of malaria.

PERRY (H. Marrian) described the existing army organization for laboratory diagnosis of malaria infection. In a malarious country the

base would have a fully equipped laboratory. There would be a mobile bacteriological laboratory for a group of casualty clearing stations, and each of these stations would have a clinical side room equipped for malaria diagnosis. Malaria diagnostic panniers for advanced medical units have proved their worth in the North-West Frontier of India and in Palestine. Training of personnel in malaria diagnosis has received adequate attention and the training of laboratory technicians has not been overlooked. Atebrin will shortly be manufactured in this country, and the home manufacture of plasmoquine is receiving attention. There would be no difficulty with regard to the supply of microscopic stains.

Manifold (J. A.) said that the Army Medical Service had had much experience of malaria since the last war : it was not now necessary to think in terms of 1914–15. The Palestine army malaria rate was 13 per thousand in 1938 : this year up to date it was 5·6 per thousand. Corresponding rates for troops in Egypt were 14 and 3·8. He described the mosquito nets now being used by troops in India and Palestine and referred to drug prophylaxis. Lately atebrin, 0·2 gm. twice a week, had been used in place of quinine. Culicifuges were of value. Anti-mosquito cream used in the army contains oil of citronella, camphor and cedar-wood oil ; applied to exposed parts of the skin it repels mosquitoes and sandflies for six hours. With regard to synthetic remedies, French preparations were available.

James (S. P.) stressed the importance of information available in the reports of the Malaria Commission of the Health Organisation of the League of Nations with regard to the distribution and epidemiology of malaria in Europe and anti-malaria measures. He was of the opinion that the scope for anti-larval measures was very limited in war time. He advocated concentration of effort on direct measures applicable to the individual soldier, and to the barracks, hut or tent in which he lived. The daily use of insecticidal sprays was of value. Five grains of quinine a day will prevent clinical attacks of malaria. It may be a difficult problem to ensure that every soldier takes his quinine but it was a problem that was solved by the brothers Sergent for the French army in Macedonia.

Manson-Bahr (P.), spoke of war experience in Palestine and of the value of the work of the diagnostic stations during that campaign.

Willcox (W.) referred to the manner in which influenza in the latter half of 1918 activated latent malaria infections in Northern Persia.

Whittingham (H. E.) thought that the Royal Society of Tropical Medicine and Hygiene might do more than it has done to instruct the public health worker in the elements of tropical hygiene, by organizing demonstrations at Congresses, by cinema films and the like. In a big war the army has to enlist the services of many who are untrained in tropical hygiene. He referred to the conservancy of microscopic stains in the field. A saturated solution of Leishman's stain, in methylated spirit, keeps in an air-tight staining pot for many months, though used daily for many films. Unfixed films are left in the pot for five minutes, washed quickly with distilled water and then dried.

Norman White.

Castellani (Aldo). **Malaria and War.** [Correspondence.]—*Lancet.* 1939. Nov. 11. pp. 1048–1049.

In the Ethiopian Campaign the Italian forces suffered very little from malaria, though operating in intensely malarious country. The

total force numbered 500,000. Throughout the war there were but 1,241 hospital admissions for primary malaria and 1,093 for relapses. The author attributes this relative freedom from clinical malaria to the administration of prophylactic quinine, which was rigidly enforced. each man received 0·6 gm., 3 tablets, of quinine bihydrochloride, or sulphate, each day. Periodic urine examinations were used to determine whether the quinine had been taken : a few drops of Tanret's reagent causes the urine to become turbid if quinine has been taken.

N. W.

SERGENT (Edmond). L'oeuvre de la commission du paludisme de la Société des Nations depuis 1930. [**The Work of the Malaria Commission of the League of Nations since 1930.**]—pp. 25–47. [12 refs.]

PIZZILLO (Giuseppe). Splenometria e tipi costituzionali. [**Splenometry and Constitutional Types.**]—*Riv. di Malariologia.* Sez. I. 1939. Vol. 18. No. 2. pp. 131–137. With 3 figs. German summary (6 lines).

The author describes the various methods in use for measuring the enlargement of the spleen. He then proceeds to show that these methods give results that are not comparable *inter se* unless account be taken of the constitutional types of the individuals concerned, based on anthropometric measurements. Various types of thorax and abdomen are figured and described. *N. W.*

ZOTTA (G.). Contribution à l'étude de la distribution des races d'*Anopheles maculipennis* en rapport avec les grandes lignes de répartition du paludisme en Roumanie. [**Distribution of Races of *A. maculipennis* in Relation to Distribution of Malaria in Rumania.**] —*Arch. Roumaines Path. Expérim. et Microbiol.* 1938. June. Vol. 11. No. 2. pp. 209–246. With 5 graphs & 2 maps.

This well documented report starts with a description of the outstanding geographical features of Rumania with special reference to the influence that these have on the distribution of anophelines and the prevalence of malaria. Four species of Anopheles have been found in Rumania, *A. maculipennis*, *A. bifurcatus*, *A. plumbeus* and *A. pseudopictus*. *A. plumbeus* plays no rôle as a vector of malaria ; it is found for the most part in forests and is most plentiful in the sub-Carpathian hills. *A. bifurcatus* is more widely distributed ; it is a wild mosquito not often found near human habitations though it will attack man even in daylight. It has not been incriminated as a spontaneous vector of malaria. *A. pseudopictus* likewise plays no rôle in the spread of malaria ; it is especially plentiful in the Danube delta and elsewhere where saline breeding places are available for its propagation. *A. maculipennis* is the only important transmitter of infection in Rumania ; four races of this species are found, *typicus*, *messeae*, *atroparvus* and *elutus*. *A. m. melanoon* has not been found, neither has *labranchiae*. *A. m. typicus* is found in all hilly regions and in the valleys of rivers down to their outflow into the Danube. *A. m. messeae* abounds throughout the low-lying parts of the country which are subject to flooding by rivers : except for hilly country it can be found throughout the country. *A. m. elutus* is confined to the littoral of the Black Sea. *A. m. atroparvus* is found on the coast and as far inland as 700 kilometres wherever saline breeding places are available ; these are numerous.

The relative frequency of the three species of *Plasmodia* is *vivax* 72·15, *falciparum* 26·30, and *malariae* 1·55 per cent. These proportions hold good for practically the whole country. Malaria is very widespread; the maximum annual number of cases according to official statistics is 400,000. This is said to be a gross understatement. In many provinces endemicity is very high. The author distinguishes the malaria of the regions liable to flooding by the Danube, malaria associated with other large rivers, malaria of other internal districts, and the *elutus* malaria of the coast, which are determined by more or less divergent and characteristic conditions of anophelism. *N. W.*

Crook (R. L.). **Some Notes on Malaria in Szechwan.**—*Chinese Med. Jl.* 1939. May. Vol. 55. No. 5. pp. 465–478. With 1 map & 2 charts. [13 refs.]

This note on the prevalence of malaria in Szechwan Province is based for the most part on the replies to a questionary supplied by 13 hospitals. In five localities school-children were examined for splenic enlargement and in the Yachow District a small number of children were examined for parasites.

Malaria is endemic throughout the Province, hyperendemic in a few localities. There has been no epidemic of malaria in recent years. For the years 1934–1937 the percentage of in-patients suffering from malaria was 4·19, and of out-patients 1·38. Reports from 10 hospitals regarding the species of parasite showed that 52·5 per cent. were tertian, 41 per cent. subtertian, and 6·5 per cent. quartan.

Five species of Anopheles have been found, *A. hyrcanus* var. *sinensis*, *A. pattoni*, *A. minimus*, *A. lindsayi* var. *pleccau* and *A. gigas* var. *baileyi*. The first three are probable vectors, *A. minimus* being the most important. No mosquito dissections have yet been carried out.

N. W.

Strickland (C.), Sen Gupta (S. C.) & Mazumdar (P. C.). **Further Observations on the Seasonal Infectivity of Mosquitoes as determined by a Study of the Incidence of Infantile Malaria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. June 29. Vol. 33. No. 1. pp. 69–74.

On a tea estate in the North Bengal Duars all children born during a period of four years were kept under observation and records were kept of the age of infants under one year at the time they first developed malaria. Infection by the mosquito may occur in any month of the year. The average interval between birth and the first attack of malaria was 120 days for those born in the cold season, 106 days for those born in the hot season, and 106 days for those born in the rainy season. *N. W.*

Ch'in (Y. T.). **Notes on Malaria in Certain Parts of Manchuria.**—*Jl. Oriental Med.* 1939. May. Vol. 30. No. 5. pp. 221–224. With 1 map.

This paper adds very little to our knowledge of malaria in North Manchuria. In Koshan, Peian and Tehtu 133 *A. hyrcanus* var. *sinensis* and 3 *A. maculipennis* were captured and dissected; none

was infected. Local conditions and native customs did not permit blood or spleen examinations ; the information about malaria is based on present symptoms and histories of past attacks. *N. W.*

EARLE (W. C.), PÉREZ (Manuel), DEL RÍO (Juan) & ARZOLA (Carmen). **Observations on the Course of Naturally Acquired Malaria in Puerto Rico.**—*Puerto Rico Jl. Public Health & Trop. Med.* 1939. June. Vol. 14. No. 4. pp. 391–406. With 1 chart. [Spanish version pp. 407–421.]

The observations recorded were carried out in an isolated village the inhabitants of which usually suffered their malaria without specific treatment. The parasite and spleen rates in the region varied between 30 and 40 per cent. Weekly observations were made from May 1931 and August 1934. A total of 76 negro children, between the ages of 5 and 15, were kept under observation ; they rarely if ever received any antimalarial drug. At each visit the species of plasmodia was determined and sexual and asexual parasite counts were made ; the spleen was measured, the oral temperature was taken and notes were made regarding any subjective symptoms of the child. In all, 10,228 blood smears were examined, of which 5,140 contained parasites, the percentage of species being *P. falciparum* 56·63, *P. vivax* 27·33, *P. malariae* 6·48, *P. vivax* and *falciparum* 8·92, *P. vivax* and *malariae* 0·33, *P. falciparum* and *malariae* 0·23, and all three species 0·08. Of the 76 individuals 41 showed all three parasites at one time or another ; 29 showed *P. falciparum* and *P. vivax* on different occasions ; 5 showed *P. falciparum* alone, and 1 had a mixed *P. falciparum* and *malariae* infection. The maximum parasite counts per cmm. of blood were *P. falciparum* 206,103, *P. vivax* 46,215, *P. malariae* 6,486. The maximum gametocyte counts were *P. falciparum* 16,376, *P. vivax* 560, *P. malariae* 1,081. There was marked variation in the distribution of parasites. *P. falciparum* was found most frequently to the exclusion of other parasites. Often *P. vivax* infections were replaced rapidly by *P. falciparum*, *P. vivax* only reappearing when *P. falciparum* infection had reached a very low level. Gametocytes of two species were sometimes observed in a single smear but high counts of both were rarely observed. The incidence of *P. falciparum* parasites in smears was highest immediately following rises in mosquito density. The incidence of *P. malariae* gametocytes was highest just after the incidence of *P. falciparum* gametocytes had reached its lowest point.

The authors believe that the onset of a new infection can be determined and that each infection probably ran a definite course to a natural cure. Fever was most common in *P. falciparum* infections at the time of, or within ten weeks after, the sharp rise in parasite counts indicative of new infections. Highest parasite counts and largest spleens were found within very few weeks after the onset of the first observed infections. The highest proportion with gametocytes was found in the first week of *P. vivax* infections, in the third week of *P. falciparum* infections. *N. W.*

FAUST (Ernest Carroll). **What the Life Insurance Companies think of Malaria.**—*Southern Med. Jl.* 1939. July. Vol. 32. No. 7. pp. 689–693.

The information contained in this paper is based on replies to a questionary received from twenty representative Insurance Companies

doing business in the Southern States. It appears that in the group of standard insurance risks malaria does not constitute a particular hazard. Some companies do not employ safeguards; others refuse to write standard policies for certain areas in the South; some demand an extra premium for residence in malarious areas, or from persons with a history of malaria. The population which suffers most from malaria belongs to a poor economic group not usually applying for standard policies. The author estimates that the average annual number of malaria cases in the South is at least a million and a half, or about 4 per cent. of the population. *N. W.*

SERGENT (Ed.), SERGENT (Et.), PARROT (L.) & CATANEI (A.). **Nomenclature of the Malarial Parasites.** [Correspondence.]—*Brit. Med. Jl.* 1939. Apr. 8. pp. 747–748.

The authors refer to the recommendation made by CHRISTOPHERS & SINTON that *Plasmodium falciparum* should be universally adopted to designate the parasite of malignant tertian malaria [see this *Bulletin*, 1939, Vol. 36, p. 390]. In the past they have used the designation *Plasmodium praecox* Grassi and Feletti, 1890, which is the *de jure* nomenclature. They agree, however, that a strict application of the rules of nomenclature would lead to much confusion and that the three common specific names for the parasites of the common malaria fevers, *vivax*, *malariae* and *falciparum*, should be universally adopted. They further consider it desirable that the specific name *praecox* should be abandoned as the designation of the first avian plasmodium described by Grassi and Feletti; it should be called *Plasmodium relictum* Grassi and Feletti, 1891. "The specific name *praecox* for a plasmodium is therefore a *nomen nudum*." *N. W.*

KITCHEN (S. F.). **The Differential Infection of Mature and Immature Erythrocytes by the Plasmodia of Human Malaria.**—*Southern Med. Jl.* 1939. July. Vol. 32. No. 7. pp. 679–685. [14 refs.]

The author has previously shown that *P. vivax* has a much greater tendency to occur in reticulocytes than in mature erythrocytes [see this *Bulletin*, 1939, Vol. 36, p. 138]. In this paper similar observations are also described on three *P. falciparum* infections, on one from the 14th to the 42nd day of the disease, on a second during the first three weeks and the sixth and part of the seventh week, and on the third from the 3rd to the 16th day of the disease. Two quartan cases were also observed.

P. falciparum shows a lack of consistency in its tendency to be associated with erythrocytes of a given age group. *P. malariae* is found most frequently in mature, or older, erythrocytes. The results suggest the existence of fundamental differences among the plasmodia in regard to the mechanism of invasion of new host cells by the merozoites. These differences may have a bearing on the densities of the different plasmodia, and on the associated anaemia and specific immunity. *N. W.*

BATES (Marston). **The Use of Salt Solutions for the Demonstration of Physiological Differences between the Larvae of Certain European Anopheline Mosquitoes.**—*Amer. Jl. Trop. Med.* 1939. July. Vol. 19. No. 4. pp. 357–384. With 4 figs. [12 refs.]

The object of this work was to devise standard laboratory methods by means of which the mineral requirements of different species or

local races of Anopheline larvae can be utilized for the purpose of recognizing these entities in the same way as morphological characters are ordinarily employed. Experiments were made with six forms of the *Anopheles maculipennis* complex and with *A. superpictus*. The larvae were kept for 3 days at 27°C. in solutions of sodium chloride, potassium chloride, magnesium sulphate and calcium sulphate, and the percentage of larvae surviving recorded. Larvae of *sacharovi* differ markedly from all others in their greater tolerance of sodium chloride ; *atroparvus* larvae from many parts of Europe have less need for calcium than any of the other forms and in the presence of calcium they are relatively tolerant of sodium chloride ; *labranchiae* is identical with *atroparvus* in its tolerance for sodium chloride but has much greater calcium requirements ; *subalpinus*, *typicus* and *messeae* are far less resistant to sodium chloride. *A. superpictus* larvae differ from all the others in their inability to survive in media in which there is not a readily available supply of calcium. *V. B. Wigglesworth.*

MAROTTA (G.) & SANDICCHI (G.). Contributo all'infezione sperimentale di anofeli con *Plasmodium malariae* e inoculazione della malattia all'uomo. [**Experimental Infection of Anopheles with** *Plasmodium malariae* **and Transmission of the Disease to Man.**]—*Riv. di Malariologia*. Sez. I. 1939. Vol. 18. No. 2. pp. 89–94. With 4 charts. English summary (5 lines).

This paper describes the infection of laboratory-bred *A. maculipennis* var. *messeae* with *Plasmodium malariae*. Sporozoites were found in the salivary glands 24 days after the infecting meal. Infection was transmitted to two patients needing malaria therapy. The incubation periods in these two patients were 23 and 29 days, respectively.

N. W.

VINOGRADSKAYA (O. N.) & TIMROT (S. D.). Culture de l'*A. superpictus* Grassi au laboratoire. [**Breeding of** *A. superpictus* **in the Laboratory.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1938. Vol. 7. No. 6. pp. 940–941. [In Russian.] [Summarized in *Rev. Applied Entom.* Ser. B. 1939. Sept. Vol. 27. Pt. 9. p. 184.]

" Details are given of the breeding in the laboratory in Moscow of *Anopheles superpictus*, Grassi, from females taken in Stalinabad (Tadzhikistan) in October 1937. Till about the end of November, the adults and larvae were kept at a temperature of 26–27°C. [78·8–80·6°F.] and from then onwards at 29–31°C. [84·2–87·8°F.] and a relative humidity of 40–50 per cent. It was found that in the laboratory, the behaviour and physiological condition of the mosquitos considerably differed from those observed in the field. In all generations, of which 5 were produced up to about the end of May of the following year, the females took blood several times before ovipositing, whereas in nature, as a rule, one blood meal is sufficient for the maturation of eggs. The majority of the initial females were in a state of gonotrophic dissociation ; although they repeatedly fed on blood, their ovaries did not develop and most of them produced fat-body. A few, however, oviposited and the resulting adults emerged between 9th and 27th November. Practically all the females of this generation also produced fat-body only, in spite of repeated feeding. Only 2 of them

oviposited, in the second half of December. The adults of the second laboratory generation emerged between 6th and 14th January, and the first batch of eggs was deposited on 28th January."

Hu (Stephen M. K.). **The House-Frequenting Behavior of *Anopheles hyrcanus* var. *sinensis* Wiedemann in the Shanghai Area, Part 2—Time of Exit.**—*Lingnan Sci. Jl.* 1939. May 13. Vol. 18. No. 2. pp. 133–142. With 5 charts & 2 figs. on 1 plate.

Observations on the time of day at which *A. hyrcanus* var. *sinensis* enters houses were recorded in a previous paper [see this *Bulletin*, 1936, Vol. 33, p. 255]. The observations in this paper concern the time of exit. A cow stable attached to a farm was selected. A tent of mosquito net was erected over the door during the observations. The door was the only means of ingress or egress for mosquitoes except for a slit three feet long and two inches wide just under the eaves on one side of the stable. During 5 consecutive days mosquitoes attempting to fly out and caught in the net were collected and counted every two hours. Anophelines began to leave the stable at dusk and continued to leave during the dark hours. The number leaving was greatest during the two hours immediately after sunset. Nearly all that were in the stable at sunrise stayed in the stable throughout the day. *N. W.*

Frohne (W. C.). **Anopheline Breeding : Suggested Classification of Ponds based on Characteristic Desmids.**—*Public Health Rep.* 1939. July 28. Vol. 54. No. 30. pp. 1363–1387. [10 refs.]

The author has devised a way of classifying ponds, etc., by their flora, particularly by the Desmids, a group of microscopic algae. He relates his conclusions to the distribution of larvae of several species of Anopheles.

All field workers would agree with the author that it is most difficult to classify fresh waters, and that such words as "pond," "seepage" or "borrow-pit" are indefinite and unsatisfactory. Biologists have frequently looked for "indicator species" by which one means plants or animals which might readily be identified and which could be made the basis of a biological classification. The author of the present paper has studied twenty-six ponds in South Carolina and Georgia and given detailed attention to the Desmids inhabiting them. The ponds vary greatly in size, exposure to the sun, etc.; moreover, the water in some was derived from artesian wells, in others from seepages or surface drainage. The paper presents a large body of fact on which the waters are divided into those poor and those rich in Desmids and then again into several sub-types. A key is provided for separating these. As to Anopheles the author comes to the tentative conclusion that *A. quadrimaculatus* and *punctipennis* generally occur in waters that are poor in Desmids and that they are unusual or sporadic in other waters. The larvae of *A. walkeri*, on the other hand, generally occur in waters rich in Desmids.

[Every malariologist will be glad to see the ecology of Anopheles looked at by a fresh pair of eyes; but one cannot feel that the author has proved his point, for there are three reasons against using the Desmids as indicator plants: they can only be seen with a microscope, their populations change rapidly, and they are at present very

imperfectly known. Indeed, the author discovered a number that were new to the U.S.A. during this investigation and was only able to identify half of the species he found.] *P. A. Buxton.*

King (W. V.). **Varieties of *Anopheles crucians* Wied.**—*Amer. Jl. Trop. Med.* 1939. Sept. Vol. 19. No. 5. pp. 461–471. With 2 figs.

Wilson (Bagster). **Infection and Immunity in Some Tribes of Tanganyika.**—Reprinted from *Acta Conventus Tertii de Tropicis Atque Malariae Morbis.* Amsterdam. 1939. Pt. 2. pp. 346–354. With 3 figs.

This paper deals with the variations in malaria reaction observed in some untreated Bantu communities. Three tribes are selected, the Digo, living between the coast and the first foot-hills; the Nyiramba, living in the centre of Tanganyika on the Iramba plateau, about 3,500 feet high; and the Sonjo living on the western shore of Lake Natron, at about the same altitude as the Nyiramba. Some of the relevant endemic indices are tabulated:—

	Parasite Rate (off-season) per cent.		Spleen Rate (off-season) per cent.		Infant Infection Rate per cent.
	aet. 1–10	adults	*aet.* 1–10	adults	
Digo... ...	91·2	48·0	85	39	87·5
Nyiramba ...	72·5	15·6	87	68	25·5
Sonjo ...	41·6	10·6	77	80	—

Parasite Counts per cmm.

Age in years.	Digo		Nyiramba	
	Off Season	Malaria Season	Off Season	Malaria Season
0–1	6,526	8,354	5,000	14,140
1–10	2,394	2,245	1,465	3,553
11–20	364	284	294	1,456
Over 20	175	180	348	1,008

The significant difference in environment of these three tribes concerns anopheline infestation. In all cases *A. gambiae* is the vector. *A. gambiae* is always present in the houses of the Digo, 1 to 15 per house, and malaria transmission is continuous. On the Iramba Plateau there are no anophelines in the houses for several months and but few in the transmission season; transmission is seasonal. In the Sonjo country *A. gambiae* is absent in the dry season.

The adult Digo has developed an immunity dependent upon, and effective against, frequent reinfection with *P. falciparum*. In the case of the two other tribes infection is not sufficiently frequent to establish and maintain a firm immunity against this parasite. After 2 to 3 years of age the Digo does not "suffer" from malaria. Clinical treatment is only necessary in early childhood pending the acquisition of immunity but should not be intensive enough to hinder such

acquisition. In areas in which frequency of infection, or anopheline infestation, is sufficient to confer only partial immunity the control of anophelines may be practicable and treatment of the sick will certainly be required. *N. W.*

SINTON (J. A.), HUTTON (E. L.) & SHUTE (P. G.). **Studies of Infections with *Plasmodium ovale*. II.—Acquired Resistance to *ovale* Infections.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. June 29. Vol. 33. No. 1. pp. 47–68. [38 refs.]

In a previous communication the authors gave an account of 108 primary infections with *P. ovale* induced in the practice of malaria therapy, and showed that their European patients had very little natural resistance to such infections [this *Bulletin*, 1940, Vol. 37, p. 54]. Reinoculation with either homologous or heterologous strains of the same parasite were carried out on 53 of these patients and the results are recorded. Both blood and mosquito parasites were used in determining the degree of resistance conferred by the primary infection. The same four strains were used, emanating from the Belgian Congo, Nigeria, Sierra Leone, and the Gold Coast: immunologically they were not markedly heterologous. Most of the primary infections ran their course untreated; a few patients received a curative course of quinine after they had had the ten to twelve febrile paroxysms required.

Among 86 primary blood inoculations failure to detect parasites in the blood was only twice experienced; among 19 patients reinoculated by this method blood parasites could be found in only four. None of the 22 primary inoculations with mosquito parasites failed; 35 per cent. of the reinoculations with mosquito parasites failed. In 85 per cent. of successful reinoculations the maximum parasite prevalence never rose as high as 1 per 100 fields of the thin film; in primary infections only 4 per cent. stayed at this low level. In 82 per cent. of primary cases maximum parasite prevalence varied from 8 to 100 per 100 fields; the maximum prevalence in an untreated primary case was 160 as compared with a maximum of 12 in a reinoculated case.

The average duration of parasite incidence in 45 untreated primary cases was 25 days as compared with 5·7 days in the 26 successful secondary inoculations, also untreated. The average parasitic incubation period in both primary and secondary infections was 15 days.

The clinical symptoms consequent on reinoculation were mild and recovery was spontaneous. Of the 53 reinoculated persons only 18 developed fever, and in three of these it was doubtful whether the slight fever was due to malaria; the average duration of fever in these 18 cases was only 4·5 days. In only 5 of the reinoculated cases did the fever attain 104°F.

Infection with *P. ovale* thus confers marked resistance to reinoculation with both homologous and heterologous strains; against the latter the resistance is more effective than is the case with either *P. vivax* or *P. falciparum*. *N. W.*

MANDEKOS (A. G.). **Malaria and Mortality among Young Children in East Macedonia (Greece).**—*Riv. di Malariologia*. Sez. I. 1939. Vol. 18. No. 2. pp. 125–130.

With the idea of assessing the importance of malaria as a cause of mortality among children under 7 years of age seven villages in

each of two areas in Macedonia, the Chryssoupolis Plain and the Philippi Plain, were kept under observation for seven years. Up to 1932 these two areas were almost equally malarious: in that year drought much reduced the prevalence of the chief vector, *A. elutus*, in the Philippi Plain, with the result that in the three subsequent years the parasite rate of children under 15 years was 35, 18 and 10 per cent., as compared with 65, 60 and 62 per cent. in the villages of the Chryssoupolis Plain. In 1933, 1935 and 1936 the general mortality among children was higher in the Chryssoupolis Plain; in 1932 and 1934 there was no significant difference. More detailed observations in the Chryssopoulis villages showed that the general mortality rate among children who harboured malaria parasites was no higher than among the others; it is probable that the former received more medical attention. Infant mortality in malarious areas does not appear to be much influenced by economic status. *N. W.*

DAS GUPTA (B. M.). **Malarial Infection in the Placenta and Transmission to the Foetus.**—*Indian Med. Gaz.* 1939. July. Vol. 74. No. 7. pp. 397–399. With 2 plates (1 coloured).

The author discusses a case of congenital *Plasmodium vivax* infection already recorded by him [this *Bulletin*, 1939, Vol. 36, p. 1006] in the light of certain observations he has made on the failure of a *P. knowlesi* infection to pass from the maternal to the foetal circulation in the case of a pregnant monkey. As has been observed in the case of human malaria by BLACKLOCK and GORDON, GARNHAM and others [see this *Bulletin*, 1926, Vol. 23, p. 130; 1939, Vol. 36, p. 492], the maternal blood in the placenta of the monkey was massively infected with parasites, while the foetal blood and organs were free from parasites. The foetus gave no evidence of anaemia, in marked contrast to the profound anaemia of the mother. It is suggested that the duration of the infection rather than its intensity is the factor influencing the passage of parasites from maternal to foetal blood. In the human case the mother had suffered repeatedly from malaria throughout her pregnancy, while the monkey had had but one acute attack. The author believes that the placental barrier is injured by a chronic rather than an acute infection. The paper is illustrated by a number of microphotographs and a coloured plate showing the condition of the placenta of the monkey. *C. M. Wenyon.*

GHIZZETTI (Carlo). Anemia perniciosa progressiva e malaria. [**Progressive Pernicious Anaemia and Malaria.**]—*Pathologica.* 1939. Apr. 15. Vol. 31. No. 570. pp. 160–163. English summary (2 lines).

This is the description of a patient who presented all the classical symptoms and signs of an advanced case of pernicious anaemia; the red cells numbered 1,035,000 and the haemoglobin (Fleischl) was down to 25. The blood picture was typical with the addition of very rare *P. falciparum* parasites. Treatment with atebrin and plasmoquine produced a remarkable cure. The author discusses similar cases reported in the literature. *N. W.*

James (Clifford S.). **Malarial Nephritis (Nephrosis) in the Solomon Islands and Mandated Territory of New Guinea.**—*Med. Jl. Australia.* 1939. May 20. 26th Year. Vol. 1. No. 20. pp. 759–761.

During ten years' practice in the Solomon Islands and in New Guinea the author has treated 22 cases of malarial nephritis ; the total number of patients admitted for all causes during this time was 6,518. With one possible exception no other case of nephritis of any kind was seen. All the patients were natives of the south-western Pacific. Of the 22 patients 17 were under seven years of age. The spleen was enlarged in all cases ; in 15 cases it extended to, or below, the umbilicus. Malaria parasites were found in 15 cases, *P. malariae* in 9, *P. malariae* and *P. vivax* in 2, *P. malariae* and *P. falciparum* in 2, and ring forms of undetermined species in 2. The chief symptoms were oedema, ascites, albuminuria and anaemia. The history of the nephritic symptoms was short, of malaria, long. Albuminuria varied with the severity of the oedema ; in mild cases the volume was one-eighth to one-sixth ; in severe cases from one-third to one-half. Hyaline and granular casts were found. In half the cases red cells were found when the urine was centrifuged. Fifteen cases were severe. When quinine was given by mouth to the first eight cases, five died. Of the 14 cases treated with intramuscular injections of quinine only one died, of intercurrent disease. *N. W.*

Rosenthal (Eugene). **Activation of Malaria by Vaccines.** [Correspondence.]—*Lancet.* 1939. June 17. pp. 1403–1404. With 1 chart.

This is a description of the activation of a latent *P. vivax* infection, in a patient suffering from ulcerative colitis, by the injection of an autogenous vaccine. *N. W.*

Sanders (J. P.) & Dawson (W. T.). **Observations on Five-Day Quinine Treatment of Malaria.**—*Southern Med. Jl.* 1939. July. Vol. 32. No. 7. pp. 693–696. [15 refs.]

Relapses within a year following the treatment of malaria with 20 grains of quinine sulphate daily for five days vary from 25 to 45 per cent. The observations were made in Louisiana and Texas. Fever is suppressed as rapidly as with much larger initial doses of quinine ; a dose of 10 grains was almost as effective as 20 grains in this respect. *N. W.*

i. Farinaud (E.) & Eliche (J.). L'utilisation des dérivés de la sulfamide dans le traitement du paludisme. [**Sulphamide Derivatives in the Treatment of Malaria.**]—*Rev. Méd. Française d'Extrême-Orient.* 1939. Mar. No. 3. pp. 220–234. With 15 charts.

ii. —— & ——. Nouvelles observations sur le traitement du paludisme par les dérivés de la sulfamide.—*Bull. Soc. Path. Exot.* 1939. June 14. Vol. 32. No. 6. pp. 674–681. With 3 figs.

i. Fifteen patients in the Maternity hospital of Saigon-Cholon, who had acute attacks of malaria during the lying-in period, were

treated with intravenous injections of soluseptasine either alone or reinforced with the oral administration of septasine or of quinine or quinacrine. The cases are described in detail. The authors conclude that these derivatives of sulphamide have a remarkable schizonticidal activity ; in from 3 to 5 hours there is a total disappearance of schizonts from the peripheral blood. They have no action at all on the sexual forms of *P. falciparum*. The gametes of *P. vivax* are, however, sensitive to the action of septasine. These drugs are not efficient antipyretics ; they are thus incomplete remedies but their marked action on schizonts gives them an important place among anti-malaria remedies.

ii. This is a shorter account of the same work. *N. W.*

Chopra (R. N.), Das Gupta (B. M.), Sen (B.) & Hayter (R. T. M.). **Prontosil in Indian Strains of Malaria.**—*Indian Med. Gaz.* 1939. June. Vol. 74. No. 6. pp. 321–324.

The authors have treated 19 cases of malaria with prontosil. They find that the drug given in doses of 3 to 4 gm. daily for five days causes the disappearance of parasites from the peripheral blood and controls the symptoms of the disease. It destroys both sexual and asexual forms of *P. vivax* and *P. malariae* ; it has no action on the gametocytes of *P. falciparum*. Its action on *P. malariae* is slow. When doses of 1·5 to 2 gm. daily for five days were given fever and parasites disappeared but recrudescences occurred within a fortnight. The conclusion is that prontosil possesses mild anti-malarial properties against Indian strains of malaria. [See also this *Bulletin*, 1939, Vol. 36, pp. 12, 260, 399, 400, 783, 786, 814, 925.] *N. W.*

Cleveland (D. E. H.) & Turvey (S. E. C.). **Use of Mapharsen for terminating Malaria Artificially Produced by Inoculation.**—*Arch. Dermat. & Syph.* 1939. June. Vol. 39. No. 6. pp. 1043–1044.

If mapharsen be used to terminate artificially induced malaria reliance should not be placed on a single dose ; relapses are likely to occur. In place of the course of quinine followed by arsphenamine commonly administered, the authors recommend a full course of mapharsen. [See also this *Bulletin*, 1939, Vol. 36, p. 398.] *N. W.*

Farinaud (E.), Lataste (C.), Baccialone (L.) & Canet (J.). Le comportement de la quinacrine dans l'organisme au cours du traitement anti-palustre. Rapport entre la concentration sanguine et l'élimination urinaire de la quinacrine. [**Behaviour of Quinacrine in the Body during Malaria Treatment : Relation between Blood Concentration and Urinary Excretion of the Drug.**]—*Bull. Soc. Path. Exot.* 1939. May 10. Vol. 32. No. 5. pp. 513–519. With 2 figs.

This is a rather more detailed account of work already published [see this *Bulletin*, 1939, Vol. 36, p. 816].

Smith (S.). **The Treatment of Malaria in a Military Population with the Synthetic Preparations.**—*Proc. Roy. Soc. Med.* 1939. July. Vol. 32. No. 9. pp. 1077–1082 (United Services Sect. pp. 19–24).

Toumanoff (C.) & Hoang-Tich-Try. Au sujet de la concordance entre l'indice gamétique et le pourcentage des moustiques infectés dans la zone à *minimus* au Tonkin. [**Relation of Gamete Index to Percentage of Mosquitoes Infected in** *A. minimus* **Areas of Tonking.**]—*Rev. Méd. Française d'Extrême Orient.* 1939. Mar. No. 3. pp. 280–284. With 1 chart.

A study has been made of the large amount of material collected by the Anti-malaria Service of Hanoi to determine what relationship exists between the gamete index and the infection rate of *A. minimus* when both have been determined simultaneously. It was found that in places in which the gamete index was below 10 per cent. the infection rate was 4·08 per cent. In places in which the gamete index was from 10 to 20, 20 to 30, 30 to 40, and above 40, the corresponding infection rates were 4·51, 4·84, 5·55 and 7·66. It would thus appear that were one to reduce the gamete index from 40 per cent. to less than 10 per cent. one would thereby produce an almost negligible reduction in the infection rate of mosquitoes. Malaria prophylaxis cannot, therefore, in such places be limited to medical measures: the contact between man and the anopheline vector must be reduced as much as possible by efficient antilarval measures. If this be done drug prophylaxis can help.

N. W.

Aziz (Mehmed). **The Water-Paris Green Mixture in Anopheline Control in the Tilliria Area, Cyprus.**—Govt. of Cyprus. Med. Dept. Papers No. V. 16 pp. With 10 figs. 1939. Nicosia: Govt. Printing Office & London: Crown Agents for the Colonies, 4 Millbank, S.W.1. [1*s.*]

The author has found that a uniform suspension is readily obtained by shaking Paris green in water, and that better results are obtained by spraying this suspension on anopheline breeding places than are given by the usual dusting methods. The author's description of making the "stock solution" (page 6) is not intelligible: apparently the strength of the suspension sprayed is about 1 gm. to the litre. The advantages of the method are economy in Paris green (only a third or a quarter of the amount used in dusting is required); much saving of time and labour; and there is much less danger of the personnel suffering from arsenical poisoning than there is when the dusting method is used. The results obtained were very satisfactory and it is proposed to extend the application of the method next year.

N. W.

Sergent (Etienne). Du cannibalisme des gambouses et d'un moyen d'y remédier. [**Cannibalism of Gambusia and a Method of preventing it.**]—*Arch. Inst. Pasteur d'Algérie.* 1939. Mar. Vol. 17. No. 1. pp. 139–142. With 2 figs.

The voracity of Gambusia is such that if they are not placed in a sufficient quantity of water they may devour their young. To circumvent this obstacle to breeding the author has devised an ingenious expedient. A cylindrical cage, 25 centimentres long and 25 centimetres in circumference, is made of galvanized metal grill with a square mesh of 3·5 millimetres. One end of the cylinder is closed with gauze, the other with a large cork. The cage is immersed in water; to it is attached a thread with a float. Gravid female Gambusia, with the characteristic black abdominal marking, are placed in the cage during

the egg-laying season (April to November on the Algerian coast). The young leave the cage and are thus protected from the mother's voracity: young adult males are slender enough to pass through the mesh. Numerous experiments have shown that Gambusia can thrive in such cages without ever coming to the surface, the cages being immersed in either stagnant or running water a metre deep.

Experiments were made to determine the optimum number of Gambusia to place in a given volume of water. Use was made of two cement tanks each a cubic metre in capacity. Into each was put an equal number of gravid females of equal size. In the one tank they were in a cage, in the other free. At the end of a month the tanks were emptied and the number of fish in each was counted. The number of fish placed in the tanks at the beginning of the experiment varied from 1 to 15. Fish were always more numerous in the tanks in which the gravid females had been placed in cages. The numbers were greatest when from 10 to 15 gravid females had been placed in the cage. In such cases at the end of the month there were 85, 170 and 186 fish in the tanks in which the females were caged as compared with 13, 20 and 34 in the tanks in which equal numbers of females had been placed free from restraint. *N. W.*

COVELL (G.). **The Principles and Economics of Antimalarial Sanitation.**—*Jl. Malaya Branch Brit. Med. Assoc.* 1939. Sept. Vol. 3. No. 2. pp. 128–133.

SCHARFF (J. W.). **An Essay on Anti-Malarial Drainage for Engineers and Doctors.**—*Jl. Malaya Branch Brit. Med. Assoc.* 1939. Sept. Vol. 3. No. 2. pp. 165–169.

KIKUTH (Walter) & MUDROW (Lilly). Chemotherapeutische Untersuchungen an den endothelialen Formen (E.-Stadien) des *Plasmodium cathemerium.* [**Chemotherapeutic Tests with the Exoerythrocytic Forms of** *P. cathemerium.*]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1939. Mar. 10. Vol. 95. No. 3/4. pp. 285–307. [14 refs.]

The authors have investigated the action of four drugs—quinine, atebrin, certuna and plasmoquine, on the exoerythrocytic schizonts (E. forms) of two species of bird malarial parasites—*Plasmodium cathemerium* and *P. relictum.*

In the case of the first of these the procedure was adopted of inoculating varying numbers of the E. forms from bird to bird. These first appeared in the organs, particularly the liver and brain, of a bird infected by sporozoites. Subinoculations were made by injecting blood or liver emulsions. When blood was inoculated E. forms appeared in the organs, but more slowly than when the liver emulsions, which were known to contain large numbers of these forms, were injected. It is concluded that with the blood inoculated a smaller number of the E. forms were injected. The authors believe with RAFFAELE that the E. forms result only from sporozoites or merozoites of other E. forms but never from the merozoites of the pigmented red cell forms. It is concluded that the merozoites of E. forms are of two kinds, the one giving rise to other E. forms in cells of the reticulo-endothelial system and the other to pigmented parasites in the red cells. The merozoites of the red cell forms give rise only to other red cell forms. By subinoculating always from the liver there was produced eventually a

fairly stable infection which was characterized by the development of large numbers of E. forms in the organs and death in five or six days. With this infection it was possible to test the action of the drugs on the E. forms. It was found that the three drugs, quinine, atebrin and certuna, given from the time of inoculation, had no action on these forms, though they had an action on the pigmented blood forms which always appeared. The birds died, as did the controls, and there were present post mortem large numbers of E. forms. This was the result even when the drugs were administered in doses which reached the limits of tolerance. A different result was obtained with plasmoquine, for this drug, though not eliminating all the E. forms, reduced their numbers considerably and so prolonged the life of the birds. Similar results were obtained when the infections were produced by sporozoite instead of liver emulsion inoculations. In the case of strains of *P. relictum* the E. forms appeared after injection of sporozoites but they did not persist as they did in *P. cathemerium* infections. Furthermore they evidently did not occur in the blood, for they were not detected in the organs after blood or organ emulsion inoculations. Accordingly the drugs were tested only on infections following sporozoite injections and here again the results were similar to those obtained with *P. cathemerium*, with the difference that as E. forms were less numerous and disappeared spontaneously soon after blood forms began to appear, it was more difficult to assess the effect on the E. forms. All the drugs in the case of both parasites delayed the appearance and development of the pigmented blood forms when the drugs were administered from the time of inoculation. In the case of certuna and plasmoquine the general result was that a cure was obtained as judged by the failure of parasites to appear in the blood for a period of six weeks' observation. The general conclusion is that all the drugs have an action on the pigmented blood forms but plasmoquine alone has some action on the non-pigmented exoerythrocytic forms in the cells of the reticulo-endothelial system. *C. M. Wenyon.*

Boyd (G. H.) & Dunn (M.). **Effects of Quinine and Plasmochin Administration upon Parasite Reproduction and Destruction in Avian Malaria.**—*Amer. Jl. Hyg.* 1939. July. Vol. 30. No. 1. Sect. C. pp. 1–17. With 1 fig. [11 refs.]

By the careful study of a number of experimental infections in canaries by *Plasmodium cathemerium* under the influence of quinine or plasmoquine treatment it was found that with appropriate doses of either drug the occurrence of schizogony, which occurs every 24 hours in normal infections, is delayed or prevented entirely, while the number of merozoites, when schizogony does occur, is considerably reduced. By a daily oral dose of 0·5 mgm. of quinine hydrochloride reproduction is retarded or prevented, while the merozoite number is reduced. With small doses the only change is the reduction in the number of merozoites. In the doses mentioned quinine does not increase the daily destruction of parasites either directly or indirectly. Plasmoquine in a daily oral dose of 0·02 mgm. has very much the same effect as quinine in the doses used. In the main, therefore, the action of the drugs used appears to be a reduction in the rate of reproduction rather than an increase in the normal destruction rate of parasites in the body. This affords an explanation of why quinine fails to eradicate an infection but reduces it to a low level. *C. M. W.*

Christophers (S. Rickard) & Fulton (J. D.). **Experiments with Isolated Malaria Parasites (*Plasmodium knowlesi*) Free from Red Cells.**—*Ann. Trop. Med. & Parasit.* 1939. July 20. Vol. 33. No. 2. pp. 161–170. With 2 graphs & 6 figs. on 1 plate.

In previous papers the authors have described the results of experiments in which the oxygen intake of isolated *Plasmodium knowlesi* was estimated [see this *Bulletin*, 1938, Vol. 35, p. 709]. The technique then employed was the liberation of the haemoglobin from the red cell by water or hypotonic salt solution and the concentration of the parasites with the stroma of the red cells, as parasite material. In the present paper similar experiments are described but in this case by the use of saponin not only was the haemoglobin removed but also the stroma of the red cell. Infected red cells were washed and the centrifuged deposit suspended in physiological saline. To this suspension was added an equal volume of a 0·2 per cent. solution of saponin in physiological saline. The mixture was then incubated at 37°C. for half an hour, after which it was found by examination of smears that the parasites, practically unaltered in form, were quite free from the host cells. The parasites were then washed free from haemoglobin and saponin by centrifugation in saline or Ringer. If the infected red cells were suspended in serum instead of saline in the first place 0·6 per cent. solution of saponin was required to give the desired result in the same time. It was shown that such isolated parasites were viable when inoculated to monkeys, and that when tested the parasites still exhibited a small oxygen intake, which was increased by the addition of glucose. *C. M. W.*

Somogyi (J. C.). **Agglutination of *Plasmodium knowlesi* by Serum of Chronically Infected Monkeys.**—*Riv. di Parassit.* Rome. 1939. July. Vol. 3. No. 2. pp. 157–170. [15 refs.] English summary.

It is shown that the serum from monkeys with a chronic *Plasmodium knowlesi* infection is capable of agglutinating the infected red blood corpuscles of another monkey, provided that 5–10 per cent. of the corpuscles contained mature parasites. The infected blood can be preserved by the addition of 2 per cent. formalin in physiological saline for three weeks before its capacity to agglutinate under the action of immune serum is lost. *C. M. W.*

Singh (Jaswant) & Singh (Harwant). **Treatment of Simian Malaria with M. & B. 693.**—*Jl. Malaria Inst. of India.* 1939. June. Vol. 2. No. 2. pp. 181–189. [16 refs.]

Eight Rhesus monkeys infected experimentally with *Plasmodium knowlesi* were treated with M. & B. 693. The drug was administered orally in the half gram tablet form, two tablets being given each day as a rule. The drug not only freed the blood of parasites but also eradicated the infection entirely in most cases, though to bring about this result on the fifth day of infection 9 gm. had to be administered. This dose is proportionally considerably in excess of that which is usually given to a human being, taking into account the difference in weight. *C. M. W.*

RABIES.

A Review of Recent Articles. XXXII.*

i. *Virus.*

Attempts by Rita[1] to cultivate the virus of rabies on the chorion-allantoid membrane of the chick have resulted in complete failure. There was no indication of multiplication of the virus, no characteristic lesions were seen on microscopic examination, and no Negri bodies were found. The observations extended to 8 series, in which eggs which had been incubated for various periods were employed.

Similarly Savagnone[2] has failed to cultivate the virus by this method. In 24 attempts there was no indication of multiplication.

Having found that inoculation of an emulsion of mouse brain (1st passage from rabid dog brain) into the brains of day-old chicks induced rabies in about 19 days, Dawson[3] attempted to infect 13-day-old chick embryos. Portions of brain from the 4th intracerebral passage in chicks were emulsified, and a dose of 0·03 cc. was used. "The eggs were opened and the embryos were inoculated according to the technique which had been developed in this laboratory" (Department of Pathology, Vanderbilt University School of Medicine). "After 4 days one embryo was sacrificed and its brain was inoculated into the brains of other embryos: subsequent passages have been made every 6 or 7 days, and the virus is now in its twelfth generation." None were allowed to hatch but the brains of the embryos killed on the 6th or 7th days contained "an enormous number" of Negri bodies. "The work at present indicates that the chick embryo brain is an ideal medium for the propagation of rabies virus . . . . Chick embryo brain provides a richer source of rabies virus than has been obtainable in the past and for this reason alone it may be of value in the preparation of the vaccine."

In attempting to demonstrate small differences in the rabicidal power of sera, and thus obtain some basis for estimating varying degrees of response to rabies vaccination, it was found that even before the addition of a neutralizing serum there usually occurred a marked fall in the titre of the virus depending upon the type of diluent employed. Attempts have been made by Milam[4] to find some method by which the titre of the virus emulsion could be stabilized at least for as long as one hour. "Fresh rabies passage virus was diluted in tenfold serial dilutions up to 1 : 10,000,000 with nine different diluents. The four highest dilutions of each were tested upon groups of 4 mice, immediately after preparation and at intervals up to 24 hours.

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* For the thirty-first of this series see this *Bulletin*, 1939, Vol. 36, p. 724.

[1] Rita (G.). Essais d'infection expérimentale de l'embryon de poulet en voie de développement avec le virus rabique fixe. (En rédaction le 20–III–1939–XVII).—*Boll. Sezione Ital., Soc. Internaz. di Microbiologia.* Milan. 1939. Jan. Vol. 11. No. 1. pp. 20–26. [17 refs.]

[2] Savagnone (Lucio). Sulla coltivabilita del virus rabbico.—*Giorn. di Batteriol. e Immunol.* 1939. May. Vol. 22. No. 5. pp. 744–748. English summary (3 lines).

[3] Dawson (James R.), Jr. Infection of Chicks and Chick Embryos with Rabies.—*Science.* 1939. Mar. 31. N.S. Vol. 89. No. 2309. pp. 300–301.

[4] Milam (D. F.). The Effect of Various Diluents acting for Short Periods on Rabies Virus in High Dilutions.—*Amer. Jl. Trop. Med.* 1939. May. Vol. 19. No. 3. pp. 297–301.

Results showed that the several diluents differed considerably. Distilled water was slightly less harmful to the virus than hormone broth. Normal saline was definitely harmful in one hour. When a 10 per cent. normal serum was added to a diluent its unfavourable effect on the virus was reduced. Serum tyrode solution was found to be the least harmful of the diluents tested and the most regular in its action. Serum water was only slightly less satisfactory and is recommended on account of the ease of its preparation." The results of these experiments, as given in the protocols, are amazingly consistent.

From experiments performed on 40 rabbits JORDAN, PEDERSEN and SHU[5] suggest that ultra violet light " could be used with great efficacy in the cauterization of rabies bites. The experiments are unfortunately too few for sound deductions to be drawn and can only be said to represent an indication that further experimentation might prove this technique to be of considerable value." The results are summarized as follows :—

	Number of Animals	Deaths	Rabies Deaths	Percentage rabid
Controls	9	5	5	55·55
Treated	31	12	7	22·58

[From this table, excluding animals which died from causes other than rabies, one finds P=0·1, which indicates that the observed difference was not significant.]

The authors intend at some future date to irradiate certain of the rabbits with eosin and some without, in order to exclude the possibility that the eosin itself acted as a lethal agent.

The high degree of virulence exhibited by strains of street virus in Rumania has on various occasions been alluded to by JONNESCO[6] [this *Bulletin*, 1933, Vol. 30, p. 136 ; 1935, Vol. 32, p. 176 ; and 1939, Vol. 36, p. 194]. During the year 1938 he has studied 31 local strains of street virus. From this examination he finds that the mean incubation for rabbits inoculated intracerebrally is 11 days. Of the 31 strains 28 showed incubations of less than 15 days, of which 7 were less than 7 days. Two strains were fixed from the 1st passage with incubations of 3 and 4 days. Eleven strains were fixed from the 2nd passage. Thus strains of high aggressiveness are common in Rumania. Jonnesco goes on to describe 3 cases in which generalized papulo-vesicular eruptions followed treatment. The method of preparation of the vaccine was that of Babes.

ii. *Symptoms and Diagnosis.*

A case of hydrophobia in which the patient exhibited in the early stages symptoms of mental abnormality is described by EVANS[7], and a second with an unusually short incubation period by SHIELDS[8].

[5] JORDAN (J. H.), PEDERSEN (H.) & SHU (S.). Bites of Rabid Animals treated by Experimental Cautery with Ultra Violet Rays and Eosin.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. July 28. Vol. 33. No. 2. pp. 233–240.

[6] JONNESCO (Démètre). Notes sur la rage.—*Arch. Roumaines Path. Expérim. et Microbiol.* 1938. June. Vol. 11. No. 2. pp. 199–208. With 3 figs.

[7] EVANS (W. S.). A Case of Hydrophobia.—*Jl. Roy. Army Med. Corps.* 1939. Sept. Vol. 73. No. 3. pp. 194–195.

[8] SHIELDS (J.). An interesting Case of Rabies.—*Jl. Roy. Army Med. Corps.* 1939. July. Vol. 73. No. 1. pp. 54–55.

A note by JORDAN[9] contains charts showing the incubation periods of a number of treated and untreated cases collected from the statistics of the Shanghai Institute. The second shows two peaks, one at the 30th and the other at the 60th day. Unfortunately the position of the bite has not been taken into consideration.

A method of preparing and fixing by the wet method, specimens for the rapid demonstration of Negri bodies is described by FARACO[10]. The technique is as follows :—

(1) A portion of nerve material, rich in cells, is picked out and dipped into 20 per cent. formalin for 2 or 3 minutes, puncturing the material with a suitable instrument in order to facilitate penetration of the fixative.

(2) The tissue is transferred to another dish containing 10 per cent. ammonia, and again punctured until it becomes soft and viscid.

(3) Excess of fluid is removed by smooth filter paper, and the material is placed on a slide near one extremity.

(4) With a slide as a spreader a smear preparation is made.

(5) The slide is inverted and placed in contact with an adequate fixative (Heidenhain's fluid has given the best results) for from 3 to 10 minutes.

(6) Dehydrate and clear by 95 per cent. alcohol, absolute alcohol and xylol.

The film is then stained by Mann's method, care being taken that before the stain is applied, any precipitate arising from the fixative is removed. An advantage of this method is that it can be applied to tissues sent in glycerine, Bedson's liquid, etc. No illustrations are given, but it appears from the text that the neurones with their processes are beautifully demonstrated, the Negri bodies appearing as beads in the protoplasmic filaments.

Experiments have been conducted by SULKIN and NAGLE[11] with a view to obtaining a method by which putrefied brain substance may still be utilized for animal experiment. As microscopical examination is under these circumstances often impossible or at best unreliable, the only possibility is to kill the bacterial flora by sterilization. After preliminary experiments with various disinfectants (merthiolate, glycerin, phenol and ether) it was found that ether was the most desirable. Its bactericidal effect on organisms in contaminated brains was first determined, and it appeared that in a 10 per cent. concentration ether exerted a definite bactericidal effect after exposure for two hours at 4°C. Exposure to this concentration for 18 hours at the same temperature had no effect upon the virulence of two strains of street virus tested. Nine grossly contaminated dog brains have been examined by this method, 4 mice being used in each case as test animals, and in each case a positive diagnosis was given.

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[9] JORDAN (J. H.). Prognosis in Rabies.—*Lancet.* 1939. Oct. 21. pp. 884–885. With 1 chart.

[10] FARACO (José). Nova technica para a obtenção de esfregaços " por compressão e distensão " de partes do encephalo, medula espinal, etc. para a pesquisa de corpusculos de Negri. Coloração rapida dos esfregaços pelo methodo de Mann.—Reprinted from *Rev. Biol. e Hyg.* 1938. Vol. 9. No. 2. pp. 90–96. English summary.

[11] SULKIN (S. Edward) & NAGLE (Nathan). Demonstration of Rabies Virus in Grossly Decomposed Animal Brains.—*Jl. Lab. & Clin. Med.* 1939. Oct. Vol. 25. No. 1. pp. 94–98. [13 refs.]

Greene and Breazeale[12] recommend that preparations of cord be used for the demonstration of Negri bodies.

Using the method of Webster and Dawson (this *Bulletin*, 1935, Vol. 32, p. 608) with some slight modification, Sulkin and Willett[13] find from extensive comparative experiments that the white mouse is superior to the guineapig as a test animal. For a diagnosis of experimental infection to be dependable, it must include the demonstration of Negri bodies, as clinical symptoms in the mouse are apt to be variable and indefinite. In order to save time accuracy of diagnosis is not lost by sacrificing mice on the 8th or 9th day after inoculation.

iii. *Pathology.*

da Costa[14] concludes that the production of rabicidal substances in the blood of treated dogs depends upon (1) whether the vaccine used is living or dead, (2) the dose given, (3) the route of inoculation, and (4) the number of injections. He was successful in demonstrating the presence of rabicidal substances with 5 per cent. and 20 per cent. living vaccines, and with 10 per cent. but not with 5 per cent. dead vaccine. These conclusions are based upon experiments in which groups of dogs varying in number from 2 to 4 were employed.

iv. *Methods of Treatment and Statistics.*

Using the mouse test described below Webster[15] has carried out comparative tests of the efficacy of various methods of immunization applied to the treatment of man or of animals. The test is as follows:—"(*a*) Dilute the vaccine tenfold. (*b*) Segregate sixteen 3 weeks old Swiss mice [an inbred laboratory strain] for vaccination and sixteen of the same age as controls. Provide at least five additional 2 weeks old mice for the virulence test. (*c*) Inject the 2 weeks old mice intracerebrally with 0·03 cc. of the diluted vaccine to determine the presence of virulent virus. (*d*) If the vaccine is designed for the treatment of man, inject sixteen mice with 1/8th the stated dose of diluted vaccine intraperitoneally for 3 to 6 days. If the vaccine is for canine prophylaxis, inject a single dose of 1/8th of the stated amount. (*e*) 3 weeks after the first injection, test vaccinated mice plus controls with 2, 4, 8 and 16 intramuscular lethal doses of virulent virus respectively (or 1, 10 and 100 intracerebral lethal doses)."

The results are as follows:—

Virulent virus injected intraperitoneally as a vaccine (Hogyes and Harris), immunized mice within 10 days and for a period of at least 9 months. Subcutaneous administration was not so successful. The margin between immunizing and infecting dose of vaccine is small.

Commercial vaccines inactivated with phenol in general failed to immunize mice. None contained virulent virus. The phenolized preparation from one commercial firm however, and the chloroformed preparation from another, immunized mice consistently when given

[12] Greene (Robert A.) & Breazeale (Edward L.). Preparations from the Spinal Cord in the Laboratory Diagnosis of Rabies.—*Jl. Lab. & Clin. Med.* 1939. Oct. Vol. 25. No. 1. p. 102.

[13] Sulkin (S. Edward) & Willett (Joseph C.). A Comparative Study of the Mouse and Guinea Pig Inoculation Methods in the Diagnosis of Rabies.—*Amer. Jl. Public Health.* 1939. Aug. Vol. 29. No. 8. pp. 921–926.

[14] da Costa (A. Monteiro). Vaccination antirabique du chien. I. Pouvoir rabicide du sérum après l'injection de différents types de vaccin.—*Arquivos Inst. Bact. Camara Pestana.* 1938. Vol. 7. No. 3. pp. 397–411.

[15] Webster (Leslie T.). A Mouse Test for measuring the Immunizing Potency of Antirabies Vaccines.—*Jl. Experim. Med.* 1939. July 1. Vol. 70. No. 1. pp. 87–106. With 2 figs.

intraperitoneally in quantities approximating 5 times that advocated per gm. of body weight in man.

Commercial canine vaccines inactivated with phenol proved non-virulent, but failed to immunize mice. Commercial canine vaccines inactivated with chloroform proved non-virulent but capable of immunizing mice provided a single intraperitoneal injection of 2 to 5 times that prescribed for dogs per gm. of body weight was given. Chloroform vaccines proved irritative to the peritoneum of mice.

By an ingenious method of procedure Behrens, Schweiger, Barker and Reeves[16] have been able to remove about 60 per cent. of nervous tissue from rabies vaccine. In order that the emulsions used should be as homogeneous as possible an elaborate procedure was adopted, for the details of which the reader is referred to the original paper. Experiments showed that 0·5 cc. in dilutions up to 1 : 25,000 injected intracranially into rabbits caused rabies with certainty. Experiments were then carried out with the object of removing suspended foreign tissue by isoelectric point precipitation. Diluted citric acid solution was employed for this purpose. It was found that 1 cc. of one-hundredth molar citric acid solution to 30 cc. of homogeneous emulsion removed about 60 per cent. of the protein. "Water clear suspensions of the rabies virus having satisfactory antigenic properties have been prepared." The m.l.d. of these increases as the percentage of protein diminishes. Emulsions are rendered avirulent after exposure to *p*H 5 for 24 hours at 25°C. It was found that immunized rabbits can withstand 2 m.l.d. but not 4. Fifty per cent. of animals vaccinated daily with 10 cc. of avirulent purified vaccine for 10 days are immune to 3 m.l.d.

Following the technique suggested by Frau Otten-van Stockum [this *Bulletin*, 1935, Vol. 32, p. 612], Boecker[17] has carried out a series of experiments to test the effects of a formolized vaccine administered prior to the infecting dose. Rabbits were treated with a rabbit vaccine containing 1·25 per cent. formalin, and then, after various intervals of time, subjected to an intramuscular dose (except in 2 animals where the dose was subcutaneous) of test virus (in 11 cases fixed virus was used, in the remainder street virus).

The summarized results are as follows :—

Dosage of Vaccine	Deaths		Survived	Total
	Rabies	Intercurrent		
700 mgm. treated	1	0	24	25
Controls	7	0	1	8
	8	0	25	33
1300–2800 mgm. treated	4	7	34	45
Controls	13	2	1	16
	17	9	35	61

[16] Behrens (C. A.), Schweiger (L. B.), Barker (J. F.) & Reeves (J. L.). Immunization against Rabies using Avirulent Purified Vaccines.—*Jl. Infect. Dis.* 1939. May–June. Vol. 64. No. 3. pp. 252–260. With 1 fig.

[17] Boecker (Eduard). Tierversuche zur Frage der immunisatorischen Wirksamkeit von Wutschutzimpfstoffen aus formalinisiertem Virus fixe.—*Ztschr. f. Hyg. u. Infektionskr.* 1939. July 10. Vol. 121. No. 6. pp. 735–742.

and the author concludes rightly that the results are very satisfactory. The only difference from VAN STOCKUM's method is that rabbit brain virus was used instead of monkey brain virus as a vaccine.

The statistics of antirabic treatment during the year 1937 in the French Colonies are shortly summarized in a publication by the French Colonial Ministry[18]. These cover 9 treatment centres in French West Africa, 2 in French Equatorial Africa, and 6 in Indo-China.

SALEUN[19] reports that during the year 1938, 36 persons were treated at the Institute in Brazzaville (French Equatorial Africa) none of whom died.

BRUNI and BUDA[20] report, as the result of numerous experiments, that paraminophenylsulphamide (Streptosil) has no action either *in vitro* or *in vivo* on rabies virus.

v. *Post Vaccinal Paralysis.*

A note in answer to a query on the prevalence and types of paralytic sequelae to antirabic treatment is given in the *Journal of the American Medical Association*[21].

vi. *Miscellaneous.*

It is pointed out by DENISON & DOWLING[22] that the incidence of rabies among animals in Birmingham, Alabama (U.S.A.), has steadily risen during the last 10 years. The problem is discussed mainly from a veterinary point of view.

A popular article summarizing measures for the prevention of rabies in its social and legal aspects is contributed by CRUVEILHIER.[23]

A. G. McKendrick.

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[18] VOGEL (E.) & RIOU (M.). Les maladies épidémiques, endémiques et sociales dans les colonies françaises pendant l'année 1937. Rage.—*Ann. de Méd. et de Pharm. Colon.* 1939. Apr. Vol. 37. Supplement. pp. 479–487.

[19] BRAZZAVILLE: AFRIQUE EQUATORIALE FRANÇAISE. RAPPORT SUR LE FONCTIONNEMENT DE L'INSTITUT PASTEUR DE BRAZZAVILLE PENDANT L'ANNÉE 1938 [SALEUN (G.)]. pp. 25–31.—Rage.

[20] BRUNI (Augusto) & BUDA (Luigi). Azione della paraminofenilsulfamide sul virus fisso della rabbia e sul virus vaccinico.—*Settimana Med.* Palermo (formerly *Riv. Sanitaria Siciliana*). 1939. Sept. 21. Vol. 27. No. 38. pp. 1131–1133.

[21] JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION. 1939. Nov. 4. Vol. 113. No. 19. p. 1754.—Paralysis after Rabies Vaccine. [Queries & Minor Notes.]

[22] DENISON (George A.) & DOWLING (J. D.). Rabies in Birmingham, Alabama. Human Mortality as affected by Antirabies Treatments.—*Jl. Amer. Med. Assoc.* 1939. July 29. Vol. 113. No. 5. pp. 390–395. With 1 chart.

[23] CRUVEILHIER (L.). Défense contre la rage et règlementation en France.—*Mouvement Sanitaire.* 1939. July. Vol. 16. No. 183. pp. 343–354.

RELAPSING FEVER.

PRÉCIS OF ABSTRACTS IN THIS SECTION.

KIRK (p. 198) shows that louse-borne relapsing fever is not endemic in the Sudan but has been introduced from time to time from Egypt, French West Africa and Abyssinia. In recent years it has been

confined to negroid labour immigrants from the west. Tick-borne relapsing fever may be present in the south but not in the north. Scaffidi (p. 198) notes that the relapsing fever of the highlands of N. Ethiopia is louse-borne.

Ordman (p. 198) describes an outbreak of 1,800 cases of tick-borne relapsing fever in Cape Province. Symptoms and post mortem findings were typical and the disease disappeared after measures had been taken against *O. moubata* in the barracks concerned.

Dubois and Pearson (p. 199) discuss variations in the power of a strain of *S. duttoni* to produce residual brain infections in mice. Sautet (p. 199) shows that rats fed on brain from other rats infected with *S. duttoni* may develop brain infections without other signs. In nature, non-apparent spirochaetosis, including syphilis, may be the result of unusual methods of infection.

Chabaud (p. 200) studied the course of infection of fowl embryos with *S. duttoni* and *L. icterohaemorrhagiae*. Both organisms multiply but the embryo dies within 8 days. On the other hand Oag (p. 200) found that though fowl embryos could be infected with *S. duttoni*, the embryos were not killed. Newly hatched ducks and adult fowls were not susceptible.

Brumpt (p. 200) describes *S. babylonensis*, a new species from Iraq which, though resembling *S. hispanica* in some respects, differs from it in cross immunity reactions and in being transmitted by *O. asperus* but not by *O. tholozani* or *O. erraticus*. On the other hand it can be transmitted by the American species *O. turicata*. Brumpt and Brumpt (p. 201) have established the identity of the Mexican and Texan strains of *S. turicatae* by cross immunity tests; it can only be transmitted by *O. turicata* in America. Brumpt *et al.* (p. 201) found 7 of 15 lots of *O. turicata* collected in Mexico to be infected with *S. turicatae*.

Davis (p. 202) found infection with 6 strains of spirochaete capable of infecting white mice, white rats and guineapigs in *O. parkeri* from rodent burrows in U.S.A. This tick may therefore be a vector to man. He (p. 202) finds that guineapigs may be infected with spirochaetes derived from *O. turicata, O. parkeri* and *O. hermsi*.

The work done by Boné (p. 203) confirms the view that the usual method of infection when a tick feeds is by the excretion of the coxal fluid containing spirochaetes. He discusses the life-cycle of the spirochaetes in the tick and points out that the granules present in the Malpighian tubules are found also in non-infected ticks.

Brett (p. 203) found under experimental conditions that the early stages of *O. moubata* prefer high to low humidity conditions. The humidity of sand or soil or cracks in walls may be much higher than that of the outside air.

Omori (p. 204) considers that the mite *Liponyssus nagoyoi* may play a part in the transmission of *S. duttoni* in epidemics in Formosa, though it is not infective by bite or the injection of faeces. In mice infection can be conveyed by ingestion of crushed infected mites or by rubbing these on the shaven skin. Sinton and Shute (p. 204) record the finding of a heavy infection of the salivary glands of a specimen of *A. maculipennis* var. *atroparvus* with a spirochaete morphologically indistinguishable from *S. culicis*. Injection into a man failed to cause infection.

Murrell (p. 205) records a positive Wassermann reaction due to *S. novyi*.

SCAFFIDI (p. 205) reports symptoms of lobar pneumonia with spirochaetes in the blood and sputum, during the course of relapsing fever in Ethiopia. He (p. 205) also records atypical cases, some of which were associated with other diseases. *C. W.*

KIRK (R.). **The Epidemiology of Relapsing Fever in the Anglo-Egyptian Sudan.**—*Ann. Trop. Med. & Parasit.* 1939. July 20. Vol. 33. No. 2. pp. 125–140. With 2 figs. (1 map). [43 refs.]

A useful account of the history of relapsing fever in the Sudan, which is of especial interest from an epidemiological point of view, since the Sudan is surrounded by countries from which it is separated physiographically and in which the disease is endemic.

Louse-borne relapsing fever was introduced into the Sudan during 1908 to 1924 from Egypt, in 1926 from French West Africa, during the great historic epidemic of relapsing fever across central Africa, and in 1936 from Italian East Africa, the latter infection being a consequence of the war in Abyssinia.

There is no evidence that louse-borne relapsing fever is endemic in the Sudan and each time it has appeared its origin can be traced to infected immigrants from adjoining countries.

During the last 12 years the disease has been confined almost entirely to negroid immigrants from the Western Sudan and French West Africa who travel about as labourers. The disease shows a tendency towards seasonal incidence after the rains, which may be correlated with the movements of these workers. Epidemics of typhus are unknown.

Whilst infections in the Southern Sudan may be carried by ticks, there is no evidence that they have played any part in the epidemiology of relapsing fever in the Northern Sudan. *E. Hindle.*

SCAFFIDI (Vittorio), Jr. Caratteri della febbre ricorrente dell'altopiano nord-etiopico. [**Relapsing Fever in the Highlands of Northern Ethiopia.**]—Reprinted from *Archivio Sci. Med.* 1937. Oct. Vol. 64. No. 4. pp. 333–394. With 14 charts. [27 refs.]

Relapsing fever in the highlands of northern Ethiopia is louse-borne, Ornithodorus not being found at a height of 2,200 metres. The author analyses the symptoms present and gives charts of typical cases and also some of greater interest of patients suffering from coincident relapsing fever and malaria in whom the crisis of the former is followed by irregular fever due to the presence of *P. falciparum*. *H. H. S.*

ORDMAN (David). **African Relapsing Fever in South Africa. An Outbreak of African Relapsing Fever in the Cape Province.**—*South African Med. Jl.* 1939. July 8. Vol. 13. No. 13. pp. 491–498. With 5 figs. [10 refs.]

The record of an outbreak of African relapsing fever (*S. duttoni*) in the Native labourers on a mine about 20 miles from Postmasburg in the North-Western area of the Cape Province.

This outbreak involved approximately 1,800 cases of the disease with 160 deaths. It began in the spring of 1936 when, in a population of about 1,600, more than 4 per cent. per month were invalided. This rose during 1937 to over 15 per cent., the outbreak being especially

prevalent during the summer months. Its nature remained unrecognized for about 16 months after which preventive measures were instituted.

The symptoms were typical of African relapsing fever and spirochaetes were present during the febrile attacks. Post-mortem studies showed signs of severe toxaemia with marked cloudy swelling of heart-muscle, kidneys and liver. The spleen was sometimes enlarged and showed considerable fibrinous exudate on the surface, or adhesions to the surrounding tissue. Congestion and some oedema of the brain was present. The disease responded to intravenous injections of 0·45 gm. N.A.B. given either in the initial stages of the fever or at the onset of a relapse.

Very large numbers of *Ornithodorus moubata* were found in the barracks occupied by the Natives and there is little doubt that the ticks were responsible for the infection. The disease disappeared after preventive measures against these parasites had been carried out.

The author also reviews the present-day knowledge of the occurrence of African relapsing fever in South Africa, which is evidently of only very sporadic occurrence in that country. *E. H.*

Dubois (A.) & Pearson (Y.). Variabilité du neurotropisme d'une souche de *Spirochaeta duttoni*. Immunité en l'absence de neurotropisme. [**Variability of the Neurotropism of a Strain of** *Spirochaeta duttoni*. **Immunity in the Absence of Neurotropism.**]—*C. R. Soc. Biol.* 1939. Vol. 130. No. 12. pp. 1379–1381.

The authors have studied a strain of *S. duttoni* from Kwango which, ten years previously, regularly produced residual brain infections in mice. Subsequently it has been kept by alternate passages in ticks and mice. A strain kept in mice for 20 passages was systematically examined from the 3rd passage onwards for residual brain infections and out of 18 mice 15 brains were negative and only 3 positive. Three months later, another series of passages from the same strain, after 6 passages, gave 8 positive and 3 negative. It would seem, therefore, that a strain may lose the property of producing residual infections and regain it after a comparatively short interval. With regard to immunity, 16 mice of the first series were reinoculated 1 to 2 months later with *S. duttoni*. Eleven mice were completely and 3 partially immune, and 2 had lost their immunity. In the second series there were 13 completely and 3 partially immune.

[The authors do not seem to have considered the possibility of variations in the susceptibility of the mice.] *E. H.*

Sautet (Jacques). Fièvre récurrente africaine et maladies inapparentes à tréponèmes. [**African Relapsing Fever and Non-Apparent Spirochaetal Diseases.**]—*Arch. Méd. Gén. et Colon.* 1939. Vol. 8. No. 3. pp. 84–87.

The author has carried out experiments with a strain of *Spirochaeta duttoni* and finds that when rats are fed with the brains of infected rats some of them develop a residual brain infection without showing any other signs of having been infected. Such rats never showed spirochaetes in the blood nor any rise in temperature, yet their brains were infective when inoculated into normal animals.

It is suggested that in nature non-apparent spirochaetosis, including syphilis, may be the result of unusual methods of infection. *E. H.*

CHABAUD (A.). Infection de l'embryon de poule par *Spirochaeta duttoni* et *Spirochaeta icterohemorragiae*. [**The Infection of the Fowl Embryo by** *Spirochaeta duttoni* **and** *Leptospira icterohaemorrhagiae*.]—*Bull. Soc. Path. Exot.* 1939. May 10. Vol. 32. No. 5. pp. 483–485.

Employing the usual technique, developing eggs have been inoculated with strains of *Spirochaeta duttoni* and *Leptospira icterohaemorrhagiae*.

With regard to *S. duttoni*, the blood of heavily infected rats or mice was defibrinated and then lightly centrifuged to remove red cells. The plasma containing the spirochaetes was then inoculated on to the chorio-allantoic membrane. Under these conditions the organisms appeared in the blood of the fowl embryo onwards from the 86th hour after inoculation, and were present in enormous numbers by the 5th day. The embryos succumbed to the infection usually by the 6th day and never survived more than 8 days, although chicks are resistant to infection. By passages from one embryo to another the incubation period was reduced to 40 hours.

With regard to *Leptospira icterohaemorrhagiae*, similar results were obtained, but the organisms did not appear until the 5th day and only in small numbers, but caused the death of the embryo within 3 to 7 days.

The development of both spirochaetes is much more abundant when the embryo is inoculated with defibrinated blood than when citrated blood is used. *E. H.*

OAG (R. Knight). **The Growth of** *Borrelia duttoni* **in the Developing Egg.**—*Jl. Path. & Bact.* 1939. Sept. Vol. 49. No. 2. pp. 339–344. With 2 figs. on 1 plate.

An additional confirmation of the fact that *Spirochaeta duttoni* may be cultivated in developing fowl embryos. [See CHABAUD above.]

Using this method the author has cultivated a strain continuously for 10 passages over a period of one month, and obtained abundant growths, but in no case was the embryo killed or any naked-eye changes produced in the chorio-allantoic membrane.

The spirochaetes invaded the blood stream of the embryo, the condition produced being similar to that occurring in man and susceptible animals. Although the embryo is susceptible, 6 newly-hatched chicks and 2 adult fowls were inoculated with negative results.

The virulence of the spirochaete in mice remained unaffected during the 10 egg transfers, but repeated passages are said to increase the motility of the organisms. *E. H.*

BRUMPT (Emile). Une nouvelle fièvre récurrente humaine découverte dans la région de Babylone (Irak). [**A New Human Relapsing Fever discovered in the Neighbourhood of Babylon (Iraq)**].—*C. R. Acad. Sci.* 1939. June 19. Vol. 208. No. 25. pp. 2029–2031.

The author collected 3 nymphs of *Ornithodorus asperus* from the deep burrow of some medium-sized rodent in the ruins of Kish, near Babylon. The adults developing from these nymphs were fed on normal guineapigs and two out of the three ticks were found to be infected with spirochaetes. This strain was found to differ from other strains of relapsing fever in its biological characteristics and is considered a distinct species, which is given the name *Spirochaeta babylonensis*.

In guineapigs it produces a relapsing type of infection with numerous spirochaetes in the blood, thus resembling *S. hispanica*; but it is distinguished by cross immunity reactions and above all by the fact that neither *Ornithodorus tholozani* nor *O. erraticus* could be infected with this Babylonian strain, whilst the bite of a single *O. asperus* is sufficient to produce infection.

On the other hand, the American species, *Ornithodorus turicata*, experimentally is found to be an efficient vicarious transmitter of *S. babylonensis*, in the same way that *O. coriaceus*, incapable of transmitting *Spirochaeta turicatae* in Mexico, its country of origin, can transmit *Spirochaeta persica* from Central Asia.

These and other examples are brought forward to show that the geographical distribution of parasitic diseases is still far from being defined, and that in widely separated countries there exist susceptible beings capable of becoming very efficient vicarious carriers, when brought in contact with reservoirs of infection. *E. H.*

Brumpt (E.) & Brumpt (L. C.). Identité du spirochète des fièvres récurrentes à tiques des plateaux mexicains et du *Spirochaeta turicatae* agent de la fièvre récurrente sporadique des Etats-Unis. [**The Identity of the Spirochaete of Tick Relapsing Fever from the Mexican Plateaux and** *Spirochaeta turicatae*, **the Agent of Sporadic Relapsing Fever in the United States.**]—*Ann. Parasit. Humaine et Comparée.* 1939. July 1. Vol. 17. No. 4. pp. 287–298.

The authors have studied the biological characteristics of the spirochaete obtained by feeding *Ornithodorus turicata* from the Mexican plateaux on white rats.

The strain was tested on 7 human subjects each of whom was bitten by 10 infected Ornithodorus. All the patients became infected after incubation periods ranging from 4 to 19 days, and the number of febrile attacks ranged from 1 to 6. Various laboratory animals were infected, including rats, mice, guineapigs, rabbits, dog, fox, cat and pig. A dormouse, spermophile and hedgehog gave negative results.

In rats the virus does not seem to persist in the brain for as long as six months.

Cross immunity tests with a strain of *S. turicatae* from Texas, which had been maintained for several years in *O. turicata*, established the identity of the Mexican and the Texan strains.

In addition, experiments were made with several vicarious species of Ornithodorus to test their susceptibility to infections with the Mexican strain. The only species of tick from Latin America found liable to infection was *O. turicata*. On the other hand, this same species was found capable of transmitting, by bite, *S. persica* and *S. babylonensis* from Asia. *S. turicatae*, however, is distinguished from these two species by its feeble infectivity to guineapigs. *E. H.*

Brumpt (E.), Mazzotti (Luis) & Brumpt (L. C.). Etude épidémiologique de la fièvre récurrente endémique des hauts plateaux mexicains. [**An Epidemiological Study of Endemic Relapsing Fever of the High Mexican Plateaux.**]—*Ann. Parasit. Humaine et Comparée.* 1939. July 1. Vol. 17. No. 4. pp. 275–286. With 4 figs. on 2 plates. [38 refs.]

After a useful historical summary of the epidemiology of relapsing fever in America, the authors give the results of the examination of

various lots of *Ornithodorus turicata* collected from various localities of the Mexican plateau during 1938.

Out of 15 lots collected in Irapuato (Guanajuato), Aguascalientes and San Luis Potosi, 7 were infected with a spirochaete identified as *Spirochaeta turicatae*, the agent of sporadic relapsing fever in the United States.

Numerous *Ornithodorus nicollei* from rat burrows near Colima, *O. talaje* from Iguala and Huistla, and *O. coriaceus* from Tehuantepec were fed on laboratory animals and failed to produce any infection.

E. H.

DAVIS (Gordon E.). *Ornithodoros parkeri*: **Distribution and Host Data; Spontaneous Infection with Relapsing Fever Spirochetes.**—*Public Health Rep.* 1939. July 21. Vol. 54. No. 29. pp. 1345–1349.

The author gives a table showing the known distribution and host data of *Ornithodorus parkeri* based on more than 44 lots collected mainly from rodent burrows in Wyoming, Montana, Utah, Washington and Colorado.

Six strains of spirochaetes have been recovered from ticks representing three of the collection areas, four strains from the northern part and one from the southern part of Sweetwater County, Wyoming, and one from Beaverhead County, Montana.

These strains are easily maintained in white mice and white rats and in the latter one strain was carried through 180 passages. In guineapigs they produce a relapsing type of infection with spirochaetes present in the blood during the relapses. In rhesus monkeys they have not yet produced febrile attacks.

No human case of relapsing fever has been reported from Wyoming, nor from the part of Colorado where *O. parkeri* has been found, but, in view of the fact that this tick is spontaneously infected with a spirochaete pathogenic in guineapigs, it is open to suspicion as a transmitting agent to man. *E. H.*

DAVIS (Gordon E.). **Relapsing Fever: the Guinea Pig as an Experimental Animal in the Study of *Ornithodoros turicata*, *O. parkeri*, and *O. hermsi* Strains of Spirochetes.**—*Public Health Rep.* 1939. Sept. 22. Vol. 54. No. 38. pp. 1721–1727. With 6 figs.

The author has tested the susceptibility of guineapigs to infection with strains of spirochaetes derived from *Ornithodorus turicata*, *O. parkeri* and *O. hermsi*.

Ten strains from these 3 species of ticks were used and all 30 test guineapigs became infected either as a result of being bitten by ticks, or the inoculation of infected rat blood. As judged by the microscopical examination of the blood, 7 guineapigs had no relapses, 17 had 1, 4 had 2, 1 had 3, and 1 had 4.

In the case of strains from *O. turicata*, more definite results were obtained by tick feeding than by the inoculation of infected blood.

The results suggest that guineapigs would be a useful adjunct to white rats and white mice in the study of relapsing fever spirochaetes occurring in the U.S.A. *E. H.*

Boné (Georges). Contribution à l'étude de la transmission de la fièvre récurrente tropicale. (Premier mémoire.) [**A Contribution to the Study of the Transmission of Tropical Relapsing Fever.**]—*Ann. Soc. Belge de Méd. Trop.* 1939. Sept. 30. Vol. 19. No. 3. pp. 279–334. [44 refs.]

The author gives a useful summary of previous work on the subject followed by details of his own observations on the transmission of *Spirochaeta duttoni* by *Ornithodorus moubata*.

The ticks were kept usually at 30°C. after having been fed on mice containing numerous spirochaetes in their blood. With regard to the coxal fluid emitted by the ticks when feeding, 4 out of 5 mice injected with it became infected. Moreover, actual spirochaetes were found by dark ground examination in 12 out of 15 specimens of the fluid, the interval between the infective meal and the examination varying from 7 days to 6 months. With regard to the salivary glands, numerous experiments with ticks infected both hereditarily and also by feeding on infected blood, gave uniformly negative results as regards their infectivity, and the author finds that the usual method of infection when a tick feeds is by the excretion of the coxal fluid containing spirochaetes.

The secretions from the Malpighian tubules also failed to produce infection in 25 experiments with ticks 4 days to 4½ months after they had been fed on infected blood.

With regard to the evolution of the spirochaetes in the body of the tick, the author finds that when ingested the organisms rapidly pass through the wall of the stomach without undergoing any intra-cellular life-cycle, and appear in the haemocoele. The quickness with which this is accomplished depends on the degree of distension of the stomach. The spirochaetes multiply in the blood of the tick and generally make their way to the coxal glands where they accumulate in the interior. The numerous short spirochaetes found in the haemocoele are interpreted as the result of the rapid division of the organisms.

The granules present in the Malpighian tubules were found in non-infected ticks and are considered to have no connnexion with the spirochaetes.

Spirochaetes were also found in eggs laid by infected females, but only in a certain percentage of them, and out of 10 mice inoculated with emulsions of eggs, ranging from 5 to 100 in each lot, only two individuals became infected. It is considered that the spirochaetes in the eggs may have a reduced virulence for mice, possibly as a result of being coated with the egg contents. *E. H.*

Brett (G. A.). **On the Period of Survival of the Egg, Larva, and First Nymph Stages of the Argasid Tick *Ornithodorus moubata*, Murray, at Different Relative Humidities.**—*Bull. Entom. Res.* 1939. July. Vol. 30. Pt. 2. pp. 247–253. [13 refs.]

The early stages of *Ornithodorus moubata* survive much longer at 25°C. (77°F.) if the humidity of the air is high. *O. moubata* is absent from the equatorial forests and it has been suggested that this is because the tick thrives best at a low humidity. But in careful laboratory experiments in which eggs, larvae and 1st stage nymphs were exposed to a range of humidities from 6·2 per cent. to 80 per cent. at 25°C. the mortality was found to be much greater under dry conditions ; the rise in mortality occurring chiefly between 50 and 30 per

cent. relative humidity. The effects of very high humidities and higher temperatures were not investigated. The ability of these ticks to thrive in an environment apparently very dry may be due to the fact, demonstrated by BUXTON, that even in very dry places the humidity of the air in the sand or soil or in cracks in walls may be far higher than it is outside and is often nearly saturated. *V. B. Wigglesworth.*

OMORI (Nanzaburo). **Transmission Experiments of Relapsing Fever Spirochaete (*Spirochaeta duttoni* Novy and Knapp) by the Agency of Tropical Rat Mite (*Liponyssus nagayoi* Yamada).**—*Taiwan Igakkai Zassi (Jl. Med. Assoc. Formosa).* 1939. June. Vol. 38. No. 6. [In Japanese pp. 899–921. [22 refs.] English summary pp. 921–922.]

The author carried out experiments in Formosa with a strain of *Spirochaeta duttoni* to determine whether it could be transmitted by the agency of the tropical rat mite, *Liponyssus nagoyoi*.

Under natural conditions when normal and infected mice were kept together in the presence of these mites, about 40 per cent. of the normal mice acquired the infection. Of the possible paths of infection, when 5 to 10 infected mites were crushed into the mouth of each mouse 0–2 days after a meal of blood containing spirochaetes, about 40 per cent. of the mice became infected. When similar mites were rubbed on the shaven skin, either healthy or excoriated, the infection rate varied from 40 to 60 per cent. with healthy skin, and 67 to 100 per cent. with excoriated. The bites of infected mites and the intraperitoneal inoculation of faeces and eggs from heavily infected females failed to produce infection. Adult mites which developed from protonymphs that had gorged on infected blood were found to contain large numbers of spirochaetes.

When ingested, spirochaetes persisted in the body of the mite for several days but gradually diminished in number until the 12th day when they disappeared (except in one doubtful instance on the 16th day). Nevertheless, mites fed on a heavily infected mouse remained infective at least up to the 33rd day after the feeding, although spirochaetes were never observed, at the latest, after the 16th day.

From these results and the general habits of this mite, it is considered that it may play a rôle in the transmission of spirochaetes from man to man in cases of epidemics of relapsing fever. *E. H.*

SINTON (J. A.) & SHUTE (P. G.). **Spirochaetal Infections of Mosquitoes.**—*Jl. Trop. Med. & Hyg.* 1939. May 1. Vol. 42. No. 9. pp. 125–126. With 1 fig. [12 refs.]

The description of very heavy infection of the salivary glands of a specimen of *Anopheles maculipennis* var. *atroparvus*, captured in England, with a spirochaete morphologically indistinguishable from *S. culicis*, Jaffé, 1907.

A man was injected with salivary glands containing these organisms and also sporozoites of *Plasmodium vivax*, but although careful haematological and clinical observations were carried out for about a year, the patient developed no signs of infection with either of these parasites. *E. H.*

Murrell (Thomas W.). **Positive Wassermann Reaction in Spirochetal Infections other than Syphilis. Report of a Case.**—*Arch. Dermat. & Syph.* 1939. Apr. Vol. 39. No. 4. pp. 667–671.

The record of a boy aged 7 years whose blood gave a positive Wassermann reaction, which was found to be due to infection with *Spirochaeta novyi*, and not to syphilis. *E. H.*

Scaffidi (Vittorio), Jr. La forma polmonitica della febbre ricorrente. [**Pneumonic Form of Relapsing Fever.**]—Reprinted from *Giorn. Ital. di Malat. Esot. e Trop. Igiene Colon.* 1937. Oct. Vol. 10. No. 10. 7 pp.

Among 250 cases of relapsing fever under the author's observation in Ethiopia were five presenting the symptoms of lobar pneumonia—sudden rise of temperature, perhaps with rigor, pain in the chest and blood stained expectoration, and fall of temperature by crisis on the seventh day. Pneumococci were not found, but in both the blood and the sputum the spirochaetes of relapsing fever were seen. *H. H. S.*

Scaffidi (Vittorio), Jr. Febbri ricorrenti atipiche. [**Atypical Relapsing Fever.**]—Reprinted from *Folia Medica*. 1937. No. 16. 18 pp. With 7 graphs. [23 refs.]

The author refers to and describes cases in Abbi Addi of relapsing fever with irregular and atypical courses and presents charts in illustration. Some are due to concomitant malaria [*cf.* enteric fever and malaria, this *Bulletin*, 1920, Vol. 15, p. 252 ; 1921, Vol. 17, p. 221] ; another to coincident typhus, a third type to associated tuberculosis, and others of a septicaemic type. The author suggests in explanation : (1) associated infection with some organism, known or not yet discovered ; (2) peculiar state of receptivity, *i.e.* the power of resistance of the subject ; or (3) the special property of the local type of spirochaete. [The last two are merely guesses and in fact savour rather of tautology than of explanation.] *H. H. S.*

RAT-BITE FEVER.

Précis of Abstracts in this Section.

Chopra *et al.* (p. 205) report on 455 cases of rat-bite fever in Calcutta ; the salvarsan group of drugs are very effective, but two drug resistant cases are recorded. Gilkey and Dennie (p. 206) report 4 cases in Kansas City.

In insufficiently treated mice, Dubois and Pearson (p. 206) show that the blood is the most common site of latent infection.

Loopuyt and Gispen (p. 207) report a case with fever of the relapsing type, local lesion and local lymphadenitis. The serum agglutinated *S. minus* and the organism was recovered from the blood. *C. W.*

Chopra (R. N.), Basu (B. C.) & Sen (S.). **Rat-Bite Fever in Calcutta.**—*Indian Med. Gaz.* 1939. Aug. Vol. 74. No. 8. pp. 449–451. With 1 chart.

Up to the present only about 150 cases of rat-bite fever have been recorded. In the present paper the authors give records of 455 typical

cases studied in the Hospital and School for Tropical Diseases in Calcutta.

During the period 1931 to 1936, 876 patients with a history of rat bite attended the out-patient department of the School, and 455 of these developed typical symptoms of rat-bite fever. Out of 191 examined, *Spirillum minus* was isolated from 123 cases from the exudates at the site of the bite. Out of 69 cases examined by animal inoculation 49 gave positive results. The rest were clinically typical cases and all responded to arsenical treatment such as N.A.B., sulpharsenol, solu-salvarsan and sulpharsamine. Out of 128 cases treated with N.A.B., all were cured and some cases which relapsed with sulpharsenol and solu-salvarsan were cured with N.A.B. Out of 174 treated with solu-salvarsan, 9 relapsed and the rest were cured. Seventeen cases treated with sulpharsamine were all cured. Two drug resistant cases are recorded.

A chart is given showing the seasonal incidence of these 455 cases, from which it is evident that in Calcutta the disease is most common in the hot weather from May to September. *E. Hindle.*

GILKEY (Harry M.) & DENNIE (Chas. C.). **Rat Bite Fever in Children.**—*Southern Med. Jl.* 1939. Nov. Vol. 32. No. 11. pp. 1109–1111. [12 refs.]

A general account of the disease followed by reports of four typical cases in children seen at the Children's Mercy Hospital, Kansas City, Missouri, where since 1924, out of approximately 16,000 patients, there have been only 12 cases of rat bite fever. The cases were treated successfully by seven to ten injections of neoarsphenamine. *E. H.*

DUBOIS (A.) & PEARSON (Yvonne). Le lieu de persistance des *Spirillum minus* au cours de la stérilisation chimiothérapique. [**The Method of Persistence of *Spirillum minus* during the Course of Chemotherapeutic Sterilization.**]—*Ann. Soc. Belge de Méd. Trop.* 1939. Mar. 31. Vol. 19. No. 1. pp. 23–25.

Mice infected with *S. minus* were treated with doses of either 914 or stibosan insufficient to cause complete sterilization and 4 or 5 days later the blood and various organs inoculated into other mice to determine which parts of the body still harboured the infection.

The authors treated 45 mice and inoculated their blood and organs into 152 mice, of which 67 died too soon for satisfactory observations, leaving a total of 85. The results are given in the following table :—

Material inoculated	No. of mice inoculated	No. becoming infected
Blood	28	18
Brain	6	2
Lung	11	4
Liver	14	9
Spleen	10	5
Kidneys	8	1
Testes	8	1
Total	85	40

It will be seen that the blood is the most common site of any latent infection (18 out of 28), and the infectivity of the various organs can be explained most reasonably as due to the blood they contain.

E. H.

Loopuyt (L.) & Gispen (R.). Een geval van rattebeetziekte (Sodoku). [**A Case of Rat Bite Fever.**]—*Nederl. Tijdschr. v. Geneesk.* 1939. July 8. Vol. 83. No. 27. pp. 3502–3503. With 1 chart. English summary (4 lines).

A man of 24 years reported sick with fever; he had a tuberculous family history and this disease was at first suspected. Enquiry revealed that nine weeks earlier he had, when at work, been bitten on the right knee by a rat. The wound healed in a week and he returned to work, but a fortnight later the site of the wound began to swell and became painful; fever came on in bouts of 2–4 days with intervals free from fever. There was enlargement of the groin glands on the right side. The blood was sent to Professor Schüffner's laboratory and the serum was found to agglutinate the *Spirillum minus* but not *L. icterohaemorrhagiae* and 0·3 cc. of blood was injected into three white mice which, nine days later, showed a peritoneal fluid containing Spirilla. *H. H. S.*

LEPTOSPIROSIS.*

Précis of Abstracts in this Section.

Davis (p. 207) gives details of the infection of fowl embryos with *L. icterohaemorrhagiae.*

Kotter (p. 208) isolated Leptospira from 4 patients in Sumatra; two were new types and were named Djasiman and Sarmin.

Kastein and Haex (p. 208) found, in post-mortem studies of the central nervous system in Weil's disease, that swelling and proliferation of the cells of the vessel walls, with aggregation of leucocytes, cause blockage and disturbance of the circulation in diffusely arranged foci. These changes are not found in other infectious diseases.

Tokuyama (p. 209) treated 6 patients with immune serum given intravenously; four recovered. *C. W.*

Davis (L. J.). **The Susceptibility of the Developing Chick Embryo to** *Leptospira icterohaemorrhagiae.*—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. July 28. Vol. 33. No. 2. pp. 263–266. [Summary appears also in *Bulletin of Hygiene.*]

An independent confirmation of the fact that the chorio-allantoic membrane of the developing fowl embryo is susceptible to experimental infection with *Leptospira icterohaemorrhagiae.* [See this *Bulletin*, 1939, Vol. 36, p. 772.]

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* Papers concerned with the public health and bacteriological aspects of leptospirosis are reviewed in the *Bulletin of Hygiene.*

On the 12th day of incubation 6 eggs were each inoculated with a culture of Leptospira, and then incubated at 33°C. The results are summarized in the following table :—

Protocol.

	Number of Egg.					
	1	2	3	4	5	6
Day after inoculation when opened ...	2nd day	3rd day	4th day	4th day	5th day	5th day
Embryo alive or dead when opened ...	Alive	Alive	Alive	Recently dead	Alive	Recently dead
Leptospira present in :						
Chorio-allantoic membrane	—	—	+	+	+	+
Allantoic fluid ...	—	—	++	+	+	—
Heart blood ...	—	—	+++	+	+++	+
Liver	—	—	++++	+	++++	+
Lungs	—	—	++	+	++	+
Kidneys	—	—	++	+	++	—
Brain	—	—	—	—	+	—
Yolk	—	—	—	—	—	—
Lesions in :						
Chorio-allantoic membrane	Nil	Nil	Hyper-plasia	Hyper-plasia	Hyper-plasia	Hyper-plasia
Liver	Nil	Nil	Fatty, necrosis	Fatty, necrosis	Fatty, necrosis	Fatty, necrosis

E. H.

KOTTER (G. F.). Leptospirosis in Atjeh. [**Leptospirosis in Atjeh.**]—*Nederl. Tijdschr. v. Geneesk.* 1939. July 15. Vol. 83. No. 28. pp. 3590–3594. English summary (5 lines).

A series of 4 cases of leptospirosis was met with in Atjeh, Sumatra. Two of these proved to be of the known types Salinem and Rachmat, but the other two were new and are named Djasiman and Sarmin. The blood or urine of each of the patients was injected intraperitoneally in guineapigs and Leptospira obtained in pure culture. Serum reactions were very definite in each of the cases and the titres obtained were 1 in 10,000 or over. *W. F. Harvey.*

KASTEIN (G. W.) & HAEX (A. J. Ch.). Histopathologische Untersuchungen bei der Spirochaetosis icterohaemorrhagica, mit besonderer Berücksichtigung der Gefässtörungen. [**A Histo-Pathological Study of Spirochaetosis Icterohaemorrhagica, with Special Reference to the Blockage of Vessels.**]—*Acta Med. Scandinavica.* 1939. Vol. 101. No. 2–3. pp. 256–289. With 24 figs. [20 refs.]

A study of the changes observed in fatal human cases of Weil's disease and various infected guineapigs.

The authors begin with an account of the changes in the central nervous system, the histological changes in which are distinctly confined to diffusely arranged foci. In these foci various types of

pathologically changed ganglion cells are found, among which those showing changes due to local anaemia take the first place. In patients who died of Weil's disease, and in cases of experimental infection in guineapigs, this arrangement can be explained on the assumption that there are foci with disturbed blood supplies. These foci can be demonstrated by means of the Benzidine staining method.

The disturbance of the circulation was found to be due to the blockage of many of the small vessels. These blockages are in turn due to primary swelling and subsequent proliferation of the cells of the vessel walls, and to a secondary adhesion or aggregation of leucocytes. In experimental infections similar changes are found. They are absent in other infectious diseases, such as poliomyelitis, diphtheria, coccus-encephalitis, and also after acute and chronic anuria caused by corrosive sublimate poisoning. *E. H.*

TOKUYAMA (Seigo). **The Intravenous Serum Treatment of Hemorrhagic Spirochetal Jaundice in Hawaii.**—*Mitt. d. Allgemeine Path. u. Path. Anat.* 1939. Vol. 10. No. 1. pp. 128–133.

A description of the treatment of 6 cases of Weil's disease in Hawaii, by the intravenous injection of immune serum. Four of the cases recovered and two died.

A total of 9 cases of the disease were diagnosed clinically and 5 bacteriologically by the isolation of *Leptospira icterohaemorrhagiae*. Out of 3 untreated cases two died, so there is little evidence that the treatment had any effect, although the author states that in two cases the injection was followed by a marked general improvement.

E. H.

HELMINTHIASIS.

Précis of Abstracts in this Section.

Cestodes.—WU (p. 210) found Taenia onchospheres in 0·6 per cent. of 56,286 patients in Peiping.

BARNETT (p. 211) points out the errors possible in the diagnosis of hydatid infection, and the danger of exploratory puncture and of the use of formalin. He gives general advice as to treatment.

LAWSON (p. 212) describes a hydatid of the liver estimated as of 56 years' duration and almost obliterating that organ, and BOLOGNESI (p. 212) considers that a cyst of the liver ruptured into the stomach. Hydatid cysts in the abdomen, the region of the neck and near the base of the bladder (simulating enlarged prostate) are described by several authors (pp. 212–213).

MAPLESTONE and MUKERJI (p. 213) regard gentian violet (in hard gelatin capsules) as a valuable drug in the treatment of *H. nana* infestation, but more work is needed to determine the most efficient mode of administration. They give the results in 12 cases treated. VERSIANI and RENAULT (p. 214) record a case of infestation with *H. diminuta*. DOLLFUS (p. 214) reports on Raillietina in Equador.

TÖTTERMANN (p. 215) found anaemia in association with *D. latum* infection in a proportion of cases. If pernicious in type it improved rapidly on unworming. VON BONSDORFF (p. 215) discusses the inhibitory action of extracts of *D. latum* and other worms on the proteolytic activity of fresh normal human gastric juice, and the proteolytic action of *D. latum* on casein. He (p. 216) found that a liver preparation exposed to *D. latum* and other worms did not lose its anti-anaemic action.

JOYEUX *et al.* (p. 216) describe native customs in Tonking which lead to ocular sparganosis. Removal of the worm should be left until the tissue reaction has formed a capsule. Reference is made to the success of novarsenobenzol treatment.

Nematodes.—CHANDLER (p. 216) shows that two forms of immunity are developed towards intestinal nematodes: a general parenteral immunity stimulated during parenteral migration of larvae, and a local intestinal immunity towards those which feed on the mucosa. The former is slow of development and only becomes effective after long continued reinfection.

DESCHIENS (p. 217) gives instructions for the cultivation of fungi with the object of destroying with their aid the larvae of nematodes in soil.

CHIAROTTI (p. 217) describes a focus of ankylostomiasis in Italy. WIJERAMA (p. 218) discusses ankylostomiasis in Ceylon.

AZMY PASHA and ZANATY (p. 218) discuss the aetiology of hookworm anaemia and show that small blood transfusions are more beneficial after than before iron treatment. MCKENZIE (p. 219), finding that the administration of vitamin B_1 rapidly cured the oedema of hookworm anaemia, suggests that this oedema is due to lack of that vitamin through loss of it in the blood extracted by the worms.

SMILLIE (p. 219) advocates the use of hexylresorcinol for hookworm infection, and discusses other drugs. VAN LOOKEREN CAMPAGNE (p. 219) notes 4 fatal cases of poisoning with oil of chenopodium and advises that it should only be procurable on medical prescription.

SANDGROUND (p. 219) describes the symptoms of creeping eruption due to the larvae of *A. brasiliense* and of a species of Strongyloides.

HEYDON and BEARUP (p. 220) report human infection with *T. colubriformis*, and BONNE and LIE KIAN JOE (p. 220) report *T. colubriformis* and another species in man in Java. *C. W.*

WU (Lu-shing). *Taenia* **Infection. Report based on Stool Examinations of 56,286 Patients in the Peiping Union Medical College.**—*Chinese Med. Jl.* 1939. June. Vol. 55. No. 6. pp. 561–565.

Presumably the examinations were by smear. Taenia onchospheres were found in 337 (0·6 per cent.) of 56,286 patients. The proportion of *T. solium* to *T. saginata* is put as 1 to 5·6. The labourer class was the most heavily infected, farmers least so, while those of high social standing, such as bankers, wealthy merchants, physicians and University professors stood between. *Clayton Lane.*

SWARTZWELDER (J. Clyde). **Clinical** *Taenia* **Infection: an Analysis of Sixty Cases.**—*Jl. Trop. Med. & Hyg.* 1939. Aug. 1. Vol. 42. No. 15. pp. 226–229. With 1 fig.

Wigand (R.). Ueber Atropin zur Bandwurmkur. Klinischparasitologische Beobachtungen III. [**Clinical Observations on Atropine in Tape Worm Infections.**]—*Deut. Med. Woch.* 1939. June 9. Vol. 65. No. 23. p. 923.

Fiebiger (W.) & Tempel (D.). Zur Bekämpfung der *Taenia saginata*. Ein Beispiel für die notwendige Zusammenarbeit von Human- und Veterinärmedizin. [**On the Control of *T. saginata*. An Example of the Need for Collaboration between Human and Veterinary Medicine.**]—*Deut. Med. Woch.* 1939. Mar. 17. Vol. 65. No. 11. pp. 422–423.

Barnett (Louis). **Hydatid Disease : Errors in Teaching and Practice.** —*Brit. Med. Jl.* 1939. Sept. 16. pp. 593–599. With 14 figs.

Errors of a dozen kinds are dealt with. Hydatid mole, hydatid of Morgagni, and the oedematous bulbous distensions of the fringes of the choroid plexus which were described by the doctor who performed the autopsy on Sir Walter Scott, have nothing to do with Echinococcus infection. Errors in behaviour with dogs result from ignorance of the parasite's life history. The cyst and its constituents are wrongly named. Errors in diagnosis Barnett knows of by the hundred and tells of two of his own. This is one :—

" The last case I showed I spoke of confidently as a typical instance of fibro-adenoma. There could be no doubt about it : ' all the signs and symptoms leapt to the eye.' There and then I proceeded to operate upon it, and to my embarrassment and to the onlookers' amusement my incision revealed a hydatid cyst."

Traps are lung, bone and brain cysts. In laboratory diagnosis there is in one direction no need to consider an eosinophilia of less than 5 per cent. and in the other negative Casoni or complement fixation tests mean nothing. Hydatid thrill is extremely rare and a cyst is usually too tense to show fluctuation. Exploratory puncture may spread scolices in the body and if the point of the needle is high in the cyst may fail to deliver them. As to prognosis, the slowness of growth and generally good behaviour of most cysts is not sufficiently recognized ; even if a cyst ruptures and seeds the peritoneal cavity with scolices things are not too bad, for Barnett has records of patients operated on twenty times or more and living to an active old age. In treatment, the adventitial coat belongs to the host and is nearly always best left to the host's care ; expectant treatment may be the best in a deeply situated lung, or calcified liver, cyst. A 2 per cent. formalin solution run into a cyst will kill scolices, but a stronger one in a liver cyst has twice in Barnett's experience killed the patient. Formalin causes hardening and necrosis of the tissues and should not be run into a lung cyst for if there is any leakage into the air passages the trouble may be very serious. It is an error to think of a primary cyst as presumably solitary, they are multiple in quite 25 per cent. of cases. But

" It does not follow that because two or more cysts are discovered they should all be operated on at the same sitting. Do not let zeal outstrip discretion. The old wisecrack that I first heard at the Mayo Clinic over thirty years ago is still worth repeating : ' There are some things worse than a second operation, and one of them is a funeral.' "

Finally, the alveolar type of hydatid almost or wholly restricted to the Bavarian Tyrol may be mistaken for cancer, indeed it is itself a malignant type of infection. *C. L.*

Lawson (Theodore C.). **Echinococcus Cysts of the Liver of Fifty-Six Years' Duration.**—*Jl. Amer. Med. Assoc.* 1939. Apr. 8. Vol. 112. No. 14. pp. 1331–1333. With 3 figs.

The duration of infection here is based on the assumption that the hydatid cysts which were removed from this man of 67 in California were survivals of an infection with which he suffered as a boy of 11.

In 1882 an abdominal hydatid cyst was operated upon at St. Bartholomew's Hospital, London. He came to America 2 years later and his appendix was removed in 1933. Since 1926 he had had bouts of pain in the upper lumbar and dorsal region and in front of the abdomen, and treatment for spinal disorder proved ineffective. A pyelogram showed a normal right kidney and palpation a mass in the right upper part of the abdomen. Operation disclosed a large hydatid ; it is estimated that about a third of an inch of liver surrounded it and that about a fifth of the liver substance remained. There were 2 masses of cysts and some isolated ones scattered about the peritoneum and the main cyst was opened by separate incision through adhesions to the dome of the liver. A week later signs of hepatic insufficiency began to show, warded off by intravenous injections of dextrose in saline. He continued to pass some cysts through the wound for nearly two months. " At present " he is well and comfortable, the operation having taken place in August 1937. *C. L.*

Bolognesi (Giuseppe). Rottura spontanea di una ciste idatidea epatica nello stomaco. [**A Hydatid Cyst of the Liver Ruptures Spontaneously into the Stomach.**]—*Riforma Med.* 1939. Apr. 15. Vol. 55. No. 15. pp. 559–562, 565. With 2 figs.

A man had suffered from haematemesis at 25 and, it was believed then, had a gastric ulcer. At 55, in the second stool after a dose of castor oil he passed a whitish ovoid mass as big as a small pigeon's egg and looking like a shelled egg—and swooned. No one seems to have seen it but its passer. X-rays showed a rounded mass, irregularly calcified, on the upper and posterior surface of the liver, and another on the lesser curvature of the stomach which seemed to give a picture of the organ's cavity. The general subject is considered in various aspects. *C. L.*

Shastry (T. S.). **A Case of Retro-Peritoneal Hydatid Cyst.**—*Jl. Indian Med. Assoc.* 1939. Mar. Vol. 8. No. 6. pp. 351–352.

A retrovesical hydatid cyst, after producing retention of urine necessitating suprapubic cystotomy, burst into the rectum. *C. L.*

Chifflet (Abel). Equinococosis preperitoneal. [**Preperitoneal Hydatid.**]—*Arch. Uruguayos de Med., Cirug. y Especialidades.* 1939. Feb. Vol. 14. No. 2. pp. 177–188. With 8 figs.

A woman, of 38, had suffered 3 abdominal operations for hydatids, the first in the liver, the second in the spleen, while the third abdominal scar was infra-umbilical. A fourth appears to have been through Douglas's pouch. After her death material was sent to Dévé who pointed out that the cysts were peritoneal, not preperitoneal.

C. L.

Lorenzo (Ramon) & Boto (Dalmiro). Quiste hidático de las regiones supra-espinosa y supra-clavicular. [**Hydatid Cyst of the Supra-Spinous and Supra-Clavicular Regions.**]—*Prensa Méd. Argentina.* 1939. May 3. Vol. 26. No. 18. pp. 883–887. With 4 figs.

After pointing out the rarity in the literature of reports of hydatid cyst of the neck, the writers describe an infection in a pregnant woman of 29. There were eosinophilia of 6 per cent., an intense Casoni reaction, hooklets in the fluid obtained from the cyst on puncture and an X-ray shadow. *C. L.*

Lewis (J. Trevor). **Hydatid Cyst simulating Enlargement of the Prostate Gland.** [Memoranda.]—*Brit. Med. Jl.* 1939. Aug. 26. p. 448.

This infection occurred in a roadman in Denbighshire. A cyst the size of a large orange and with partly calcified walls pushed the base of the bladder forwards. When this organ was opened suprapubically the cyst burst expelling daughter cysts. Recovery has been good apart from occasional attacks of cystitis. *C. L.*

Speziale (Vittorio) & Berger (Renato). Echinococcosi policistica secondaria locale del polmone. [**Secondary Hydatid of the Lung.**]—*Riforma Med.* 1939. May 20. Vol. 55. No. 20. pp. 759–764. With 3 figs.

Pardal (Ramon). Hidatidosis múltiple del encéfalo. "Conos de presión" y "poussées" de edema en la determinación de sindromes sucesivos diferentes. [**Multiple Hydatid of the Brain.**]—*Prensa Méd. Argentina.* 1939. May 17. Vol. 26. No. 20. pp. 965–973. With 5 figs. [29 refs.]

Maplestone (P. A.) & Mukerji (A. K.). **Eradication of *Hymenolepis nana* Infection.**—*Indian Med. Gaz.* 1939. Apr. Vol. 74. No. 4. pp. 195–198.

"These observations indicate that gentian violet is a valuable drug for treatment of *H. nana* infection, possibly the only one of any real value. Much more work is needed to decide whether a course of treatment for a week or longer or several courses of three days' duration at weekly intervals will prove to be the best. The interrupted form of treatment instead of a continuous course of six or seven days was tried on some of our cases in an effort to avoid the nausea and vomiting which is fairly common with this drug."

The gentian violet was always given in hard gelatin capsules and the absence of eggs was determined by D.C.F. The lines of treatment are based on the work of Shorb [this *Bulletin*, 1934, Vol. 31, p. 117] [who found that in mice the prepatent period varied from 11 to 16 and the period of egg production from 1 to 11 days] and of Hunninen [this *Bulletin*, 1936, Vol. 33, p. 99] [who found long periods of absence of eggs from the stools]. Taking these last into view, the authors feel that, until more is known, an interval of a month, or even longer till knowledge is more exact, should be allowed to pass before the absence of infection can be concluded. The authors treated twelve infections

with an adult dose of 1 grain three times a day for varying periods according to circumstances.

Case 1, treated for 5 days ; eggs disappeared on the sixth day ; period of observation 8 days. *Case* 2, treated for 6 days and also given oil of chenopodium and tetrachlorethylene for hookworm, Ascaris and Strongyloides. *H. nana* eggs disappeared ; period of observation seems to have been 2 days after treatment ceased. *Case* 3, treated twice with santonin and oil of chenopodium for Ascaris ; *H. nana* eggs then being found for the first time gentian violet was given for a day, stopped because of vomiting, resumed after 2 days and abandoned on account of the recurrence of vomiting ; period of further observation 4 days during which no eggs of *H. nana* were found. *Case* 4, gentian violet stopped after 4 days on account of vomiting ; further observation for 3 days during which no eggs were found. *Case* 5, gentian violet five courses given because eggs reappeared four times, none was found three months after the last course. *Case* 6, two courses of treatment did not unworm. *Case* 7, treatment stopped on fifth day on account of vomiting, and on that day eggs disappeared and were not seen again during 23 days of observation. *Case* 8, treatment interrupted by vomiting, one egg seen a month after treatment ceased and none during the next month. *Case* 9, three four-day courses with three-day intervals had no apparent effect. *Case* 10, three three-day courses, eggs appearing on the second day of the last course, but no more before discharge 9 days later. *Case* 11, three courses and still positive a month after the last. *Case* 12, positive 23 days after treatment ceased. *C. L.*

VERSIANI (Waldemar) & RENAULT (Livio). Parasitismo humano pela " Hymenolepis diminuta " (Rudolphi, 1819). [**Human Infection with** *H. diminuta*.]—*Brasil-Medico.* 1939. Apr. 15. Vol. 53. No. 16. pp. 453–454. With 1 fig.

A child of 6 was passing in the faeces *Giardia lamblia* and eggs of Ascaris, Enterobius and *H. diminuta*. Oil of chenopodium brought away thread worms and a headless *H. diminuta*. It seems to have been 40 days later that eggs of the tapeworm reappeared. A second dose of the vermifuge brought away once more a headless strobile, but there was no recurrence. *C. L.*

CLAPHAM (Phyllis A.). **Some Polyradiate Specimens of** *Taenia pisiformis* **and** *Dipylidium caninum*, **with a Bibliography of the Abnormalities Occurring among Cestodes.**—*Jl. Helminthology.* 1939. Aug. Vol. 17. No. 3. pp. 163–176. With 2 figs. [129 refs,]

DOLLFUS (Robert). Cestodes du genre *Raillietina* récemment observés chez l'homme en Equateur. [**Raillietina in Man in Ecuador.**]—*Bull. Soc. Path. Exot.* 1939. June 14. Vol. 32. No. 6. pp. 660–665.

Specimens of Raillietina passed by man in Ecuador were sent to BRUMPT by Luis A. LEÓN and are divided by Dollfus into 5 species, of which a fuller description will be given later. Their names are *R.* (*Raillietina*) *quitensis* Luis A. León, 1935, *R.* (*R.*) *luisaleoni* n. sp., *R.* (*R.*) *brumpti* n. sp., *R.* (*R.*) *equatoriensis* n. sp., *R.* (*Führmannetta*) *leoni* n. sp. *C. L.*

Tötterman (Guido). Ueber Sternalmark und Blut bei Wurmträgern (*Bothriocephalus latus, Taenia mediocanellata*). [**Sternal Marrow and Blood in those infected with** *D. latum* **and** *T. saginata.*]—*Acta Med. Scandinavica.* 1939. Supplement 104. 176 pp. [123 refs.]

In those harbouring *D. latum* erythropoiesis in the marrow is with normoblasts, and a slight tendency to the left in the nuclear index of neutrophils points in the same direction, though these are only average conditions. When anaemia is hypochromic the number of normoblasts is as usual not raised. On the average eosinophils are little increased. But when there is anaemia of the pernicious type the marrow has the corresponding character, an increased erythropoiesis with more megaloblasts and promegaloblasts. In the blood of those harbouring this parasite the average diameter of red cells is slightly increased, there is an increase in eosinophils and some tendency to leucopenia. In 14·8 per cent. of cases there was slight anaemia, caused perhaps by the infection, but it was very rarely of the pernicious type, and the achylia in these slight cases was no greater than in the infected without anaemia. In 7 patients in whom the colour index was lowered there was no improvement after unworming. In many there was bile pigment in the urine suggesting liver damage. When anaemia was of the pernicious type it improved rapidly on unworming.

In Taenia patients there was marked eosinophilia in marrow and blood, but erythropoiesis was uninfluenced. As to whether the infection causes anaemia, the number of cases seen, nearly all women, were too few for safe conclusions to be drawn. *C. L.*

von Bonsdorff (Bertel). **The Influence of Intestinal Worms on the Proteolytic Activity in Vitro of Trypsin, Papain and Pepsin and Especially of Human Gastric Juice at Neutral Reaction.** *Diphyllobothrium latum* **and Pernicious Anemia. II.**—*Acta Med. Scandinavica.* 1939. Vol. 100. No. 3–5. pp. 459–482. With 7 figs. [10 refs.]

"Aqueous extracts of fresh and dried Diphyllobothrium latum and Taenia saginata and of fresh Ascaris lumbricoides exercise a marked inhibiting influence upon the proteolytic activity of normal human gastric juice (on casein) at a reaction in the vicinity of the neutral point. The same substances do not inhibit the action of trypsin, papain, and pepsin and of gastric juice at strong acid reaction; on the contrary, the hydrolysis expressed in increase in nitrogen in the trichloracetic acid filtrates is more marked in the digests containing worm emulsion. The worm proteins are quickly digested by trypsin, papain, and pepsin, but not by gastric juice at pH 7·4. The addition of a broth culture of B. coli does not noticeably influence the proteolytic effect either of trypsin, or pepsin, or of gastric juice, at neutral reaction. Diphyllobothrium latum has considerable proteolytic effect on casein. The maximum digestion is with pH 4; with a lower pH the digestion decreases quickly, with a higher pH more slowly; a moderate digestion still occurs with neutral and slightly alkaline reaction. Within the range of this acidity there is an auto-digestion of the worm. The enzymatic activity of Taenia saginata and Ascaris lumbricoides is less. The worm enzyme is possibly identical with cathepsin."

C. L.

VON BONSDORFF (Bertel). **Liver Extract exposed to the Action of Intestinal Worms does not lose its Anti-Anemic Effect.** *Diphyllobothrium latum* **and Pernicious Anemia. I.**—*Acta Med. Scandinavica.* 1939. Vol. 100. No. 3–5. pp. 436–458. With 15 figs. [15 refs.]

" A liver preparation which was exposed in vitro to the effects of fresh Diphyllobothrium latum, Taenia saginata and Ascaris lumbricoides, of boiled Diphyllobothrium latum, of alcohol extract of Diphyllobothrium latum and of B. coli, did not lose demonstrably in anti-anemic effect through any of these treatments."

JOYEUX (B.), TRUONG-CAM-CONG & NGUYEN-XUAN-NGUYEN. Nouvelles contributions à l'étude de la sparganose oculaire au Tonkin. [**New Studies on Sparganum of the Eye in Tonking.**]—*Rev. Méd. Française d'Extrême-Orient.* 1939. Jan. Vol. 24. No. 1. pp. 27–46.

A study of 14 cases of sparganum infection of the " eye " seen in the Tonking delta during nine months.

The infection is becoming steadily commoner. The reptile poultices which caused all these infections were made from the tree frog *Rana limnocharis limnocharis*. The method is to apply either the emptied abdominal cavity to the eye, or to chop up the flesh of the thighs (or if over-scrupulous the whole animal) and make from it a poultice. The reasoning which led to this strange prescription is probably two-fold. The frog is cold-blooded and so tends to quench fiery inflammation ; moreover some of these conjunctival inflammations are believed to be due to worms, and frogs eat worms. Again the fluid got when this frog is cut up and macerated cures oedema and ascites ; when *R. leucomystax leucomystax* is cleaned, grilled and eaten it cures anasarca and when eaten raw the eczema of children ; again *Kaloula pulchra* furnishes in the secretions from the glands on its back a fine remedy for silkworm bites, though the writers sceptically ask whether anyone has ever seen a silkworm biting. Other reptiles are held locally to be as efficacious for other troubles. The sparganum may settle in the lids, may penetrate the orbital fat but not the globe (though secondary bacterial infection may reach this) or it may burrow towards the surface, the face, the temple, the root of the nose, or the region of the cheek.

At first the lid is inflamed and, if the swelling is opened now, bits of parasite are apt to be left behind even after careful curetting ; when the tissue reaction encapsules the worm, removal is relatively easy, though the siting of nodules is various ; lastly the nodule then becomes more and more elastic, but still distinctly bounded. The histology resembles that of syphilis, and there are no polymorphonuclears, haematoidin crystals or blood pigment. In view of the success of novarsenobenzol in treatment the writers ask to what extent the reaction is a syphilitic one. The 14 cases are described in detail. There are several printing errors. *C. L.*

CHANDLER (Asa C.). **The Nature and Mechanism of Immunity in Various Intestinal Nematode Infections.**—*Amer. Jl. Trop. Med.* 1939. July. Vol. 19. No. 4. pp. 309–317. [20 refs.]

" There are two phases of immunity in intestinal nematode infections, (*a*) a general parenteral immunity stimulated mainly by metabolic products of growing and developing larvae during a period of parenteral migration

or mucosal burrowing, and (*b*) a local intestinal immunity stimulated by metabolic products of adult reproducing worms. In worms like Nippostrongylus, Strongyloides, and Trichinella, which feed on intestinal mucosa as adults, the intestinal immunity plays a dominant and important part in the functional immunity of the host, causing a powerful and rapidly-developing resistance to reinfection, but against blood-suckers like hookworms and Haemonchus there is no effective local intestinal immunity. Reaction against these worms depends upon the less powerful and more slowly developing parenteral immunity, which becomes effective only after long-continued reinfection. Some Ascaridata, *e.g.*, Ascaridia and Heterakis, stimulate a rapid and effective acquired resistance in spite of the fact that they are commonly thought to feed mainly on intestinal contents, suggesting that they may have some dependence on living mucosal cells throughout their lives and not merely during the period of initial burrowing."

Deschiens (R.). Considérations relatives à la destruction des larves de nématodes parasites par des hyphomycètes prédateurs. [**The Destruction of Nematode Larvae by Fungi.**]—*Bull. Soc. Path. Exot.* 1939. May 10. Vol. 32. No. 5. pp. 459–464.

Can the action of fungi which prey on free-living larvae of nematode parasites be used with satisfaction by man to destroy the cycle of infection of his own nematode parasites and those of his stock ?

To answer this question it must be possible to obtain the fungi in sufficient quantity, and to sow the material on the land, the mycelium must grow there, and must be harmless to man, beast, and vegetation. The fungi best used are *Arthrobotrys oligospora*, *Dactylella bembicodes* and *D. ellipsospora*. They can be cultured readily on moist straw in petri dishes sterilized for half an hour at 140°C., or on the germs of oats or rye, the first and last giving an abundant mycelium in 10 to 12 days, the second in a month. The cultures are dried, put through a chaff-cutter and then broken up into a coarse powder. This is scattered on the soil or suspected faeces ; a dense mycelium grows on and below the surface, or even in water. Only experience can tell whether it is as harmless as it seems to vegetable and animal life. [See also this *Bulletin*, 1939, Vol. 36, p. 829.] *C. L.*

Descazeaux (J.). Action des champignons hyphomycètes prédateurs sur les larves de certains nématodes parasites des ruminants. [**Action of Mycelial Fungi on Nematode Larvae.**]—*Bull. Soc. Path. Exot.* 1939. May 10. Vol. 32. No. 5. pp. 457–459.

Roubaud (E.) & Descazeaux (J.). Action de certains champignons prédateurs sur les larves des strongylidés du cheval. [**Action of Predatory Fungi on the Larvae of Strongyloides of the Horse.**]—*Bull. Soc. Path. Exot.* 1939. Mar. 8. Vol. 32. No. 3. pp. 290–294. With 2 figs. on 1 plate.

Chiarotti (Cesare). Descrizione di un focolaio rurale di anchilostomiasi. [**A Local Focus of Hookworm Infection.**]—*Giorn. di Batteriol. e Immunol.* 1939. July. Vol. 23. No. 1. pp. 82–87. English summary (5 lines).

The focus described comprises market gardens round Novara.

By Willis gravity floatation technique the faeces of 38 persons were examined. At the first collection 17 showed hookworm eggs, but a

second some days later disclosed two more infections, and the inference is drawn that hookworms do not pass eggs sufficiently regularly for them to be present in all stools. They varied from 1 to 11 per preparation. [The underlying inference is that the Willis technique will always in all hands display eggs if they are present in the faecal material used.] Of them, 17 showed more or less pronounced clinical evidence of ankylostomiasis. Of blood examinations made, 16 were held to be normal and 5 characteristic of the infection, the latter group showing this average: haemoglobin 65 per cent., red cells 3,540,000, eosinophils 11 per cent. All houses are supplied with latrines and cesspits, but the market gardens are habitually used for defaecation and work in them is done with feet bare or shod only with clogs. *C. L.*

Thiodet (M.). Sur trois cas d'ankylostomose observés en Algérie. Infestation simple. Association avec le paludisme. [**Three Simple Infections with Hookworms, associated with Malaria.**]—*Bull. Soc. Path. Exot.* 1939. Apr. 4. Vol. 32. No. 4. pp. 437–441.

Wijerama (E. M.). **Ancylostomiasis in Ceylon.**—*Jl. Ceylon Branch Brit. Med. Assoc.* 1939. May. Vol. 36. No. 3. pp. 193–196.

Of 2,000 consecutive admissions to the author's wards in the General Hospital, Colombo, hookworm eggs were found in 1,040, or 52 per cent.

Comparing patients from Colombo with those from out-stations the detected infection rate of the first group was 23·2 and of the second 69·9, and the average egg counts per gram were respectively 3,864 and 6,566.

Once more there was no evidence of relationship between egg counts and worms passed after treatment in a particular case, but there was a general relationship between the number of eggs passed and anaemia; and once again there is evidence that the infection predisposes to illnesses of various kinds. *C. L.*

Azmy Pasha (S.) & Zanaty (A. F.). **Iron and Blood Transfusion Therapy in Ancylostoma Anaemia. With a Preliminary Note on Bone Marrow Findings.**—*Jl. Trop. Med. & Hyg.* 1939. Sept. 1. Vol. 42. No. 17. pp. 263–271. With 5 charts & 3 figs. [24 refs.]

The authors' conclusions are as follows:—

"(1) An attempt was made to study the therapeutic effects of small blood transfusions in ancylostoma anaemia before and after the administration of iron.

"(2) Before iron is administered they have a slight and temporary haematinic value both in the presence and after the expulsion of the worms. After the completion of the iron therapy, on the other hand, they induce a further rise of haemoglobin and red blood corpuscles in which the first transfusion produces the optimum effect.

"(3) The bone marrow of ancylostoma anaemia shows a general hyperplasia in which erythropoiesis is remarkably dominant. It is normoblastic and sometimes, especially in children, macro-normoblastic.

"(4) The etiology of ancylostoma anaemia is discussed and the similarity of its blood and bone marrow pictures apart from the eosinophilia to idiopathic hypochromic anaemia is stressed. Probably both have an essentially similar pathogenesis, namely chronic bleeding.

"(5) It is suggested that a small blood transfusion might have a similar effect and find a practical application in the treatment of idiopathic hypochromic anaemia after iron saturation."

This paper is based on study of 20 cases. *C. L.*

McKenzie (Alan). **Deficiency of Vitamin B_1 in Hookworm Anaemia.**—*Lancet.* 1939. May 20. pp. 1143–1145. With 1 chart.

The author's summary is as follows :—

"(1) Two cases of hookworm anaemia in which a considerable degree of oedema was present are described, where treatment with vitamin B_1 in the form of brewers' yeast and betaxin rapidly cured the oedema after treatment with iron and the provision of a generous diet had failed to do so. (2) In each case the administration of betaxin was followed by increased diuresis, an action which does not appear to have been recorded apart from true beriberi. (3) The result of this treatment suggests that the oedema which accompanies hookworm anaemia is due to a deficiency of vitamin B_1, which is in turn due most probably to loss of vitamins in the blood extracted from the host by the hookworm."

Smillie (W. S.). Recientes progresos en la terapeutica de la ancylostomiasis. [**Recent Advances in the Treatment of Hookworm Infection.**]—*Medicina de Hoy.* Habana. 1939. Apr. Vol. 4. No. 4. pp. 174–178.

In order of election the drugs are put as hexylresorcinol, tetrachlorethylene, carbon tetrachloride and oil of chenopodium ; thymol has no mention. It is noted that the standard adult dose of carbon tetrachloride is 3 cc., yet it is noted that 1 cc. has killed an adult. Tetrachlorethylene it seems to be hinted, does not deserve the second place when there is also Ascaris infection, since it has killed by activating these. Yeager's bore-hole latrine is characterized as indeed an advance in rural hygiene. *C. L.*

van Lookeren Campagne (J.). Vergiftiging door oleum chenopodii. [**Poisoning with Oil of Chenopodium.**]—*Nederl. Tijdschr. v. Geneesk.* 1939. Nov. 18. Vol. 83. No. 46. pp. 5472–5476. English summary (5 lines).

"In the province of Groningen 4 fatal cases of poisoning by chenopodium oil were observed within three years. In none of these cases the anthelmintic had been given on medical prescription. It is thought necessary that so dangerous a drug should be obtainable at pharmacists' shops only, on medical prescription, and that great caution should be observed in its administration."

Stiles (Charles Wardell). **Early History, in Part Esoteric, of the Hookworm (Uncinariasis) Campaign in our Southern United States.**—*Jl. Parasitology.* 1939. Aug. Vol. 25. No. 4. pp. 283–308.

Sandground (J. H.). **Creeping Eruption in the Netherland East Indies caused by the Invasion of the Larva of** *Ancylostoma braziliense.*—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1939. Mar. 28. Vol. 79. No. 13. pp. 805–810. With 4 figs. on 1 plate.

A personal experience of 55 days of irritation often infuriating, which followed the spilling on the finger of a culture of infective larvae of *A. brasiliense* and of a Strongyloides species, both obtained from the

faeces of a cat. There were intermissions followed by reappearance of symptoms. At last a piece of skin was cut out ; the epidermal tunnels were empty but the larva was found coiled in the corium 1·5 mm. from the surface. In Batavia, affected European children are often used to playing in a sand box placed in the shade ; such slightly moist sand is selected by cats for defaecation ; and in it the larvae of *A. brasiliense* grow readily to infectivity. *C. L.*

Heydon (G. A. M.) & Bearup (A. J.). **A Further Case of Human Infection with *Trichostrongylus colubriformis* in New South Wales.**—*Med. Jl. Australia.* 1939. May 6. 26th Year. Vol. 1. No. 18. pp. 694–695.

A girl of 4 under treatment for burns passed in the faeces eggs of the strongyle type measuring 90μ by 47·5μ. Larvae cultured from them and fed to rabbits produced adult *T. colubriformis*. *C. L.*

Bonne (C.) & Lie Kian Joe. Over het veelvuldig voorkomen van een Trichostrongylussoort, vermoedelijk *Trichostrongylus colubriformis* (Giles 1892) in de darm der bewoners van Java. (Voorloopige mededeeling.) [**The Frequent Occurrence of (probably) *T. colubriformis* in Javanese.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1939. Nov. 7. Vol. 79. No. 45. pp. 2868–2872. With 2 figs. on 1 plate. English summary (9 lines).

" In 10 out of 40 Javanese patients a species of Trichostrongylus was discovered in scrapings of the duodenal mucosa. In the structure of the bursa copulatrix most specimens show great similarity with Trichostrongylus colubriformis.

" A second species with different bursal structure is probably present.

" The eggs are easily mistaken for Necator eggs ; there is a certain overlapping of the size ranges of both kinds of eggs, the Trichostrongylus eggs being a little larger."

MISCELLANEOUS.

Native Medical Practitioner. Journal of the Central Medical School, Suva, for the Native Medical Practitioners in Fiji and the Neighbouring Island Groups. 1939. Mar. Vol. 3. No. 1. pp. 413–457.

This journal contains 13 papers, 8 of which are written by Native medical practitioners, one by a student and the remainder by British doctors. It may be read from two points of view, the first that of interest in the problems raised, in which the native authors have the immense advantage of intimate knowledge of the population which is impossible for Europeans to acquire ; the second that of interest in the Native practitioners themselves. In regard to the latter it may be said that these papers show good sense and a spirit of enquiry which reflect the greatest credit on the Native practitioners and their teachers. For instance, in the first paper, on tuberculosis in Fiji, Baravilala realizes that natives cannot be expected to obey instructions as to segregation of infective patients unless they have some understanding of the principles of infection and unless suitable accommodation is provided. He therefore suggests education of the general public and

the construction of simple but suitable pavilions in various districts. As he says, the problem is not one of choice between surgical measures or medical treatment in a sanatorium, but is a question of deciding on simple preventive measures in the villages. There is nothing meretricious in this thesis.

Numa gives an account of medical conditions on Penrhyn Island where there are 37 lepers in a population of 540, and " no family . . . . can boast that they are leprosy-free."

Okesene conceived the idea of using the fibres in the husk of coconut instead of silkworm gut for stitching wounds. The fibres are obtained from mature nuts and used after boiling for 15 minutes and in the first cases both fibre and silkworm sutures were used for the same wound. These controlled experiments showed that fibre was less likely to become infected than silkworm gut. He has now used fibre in 29 cases with excellent results, healing taking place more quickly than with silkworm gut.

Naou describes an operation for elephantiasis of the scrotum successfully carried out by himself and Teauoki.

Togamau Fa'atiga carried out dispensary work in 22 villages which are visited every month. For an epidemic of measles he gave injections of blood from convalescents to the contacts. Only 2 contacts developed the disease.

Attention is drawn by Ieni Sementafa to the fact that it is difficult to induce the natives to obey medical instructions. Pulmonary tuberculosis is probably the commonest cause of death in Kadavu. An outbreak of bacillary dysentery was treated with anti-dysenteric serum and quarantine of affected villages.

Eroni Leauli gives an account of his handling of two patients, one with retained placenta, the other with retained products of conception after miscarriage.

In addition to these papers by the native personnel one other, by a third-year student, and one by a British medical man are reviewed separately in the *Bulletin of Hygiene*, 1939, Vol. 14, pp. 802, 820. Beattie contributes a paper on midwifery in Fiji and Maxwell shows how useful is Bettman's modification of the tannic acid treatment of burns, in which 10 per cent. silver nitrate solution is applied immediately to the tannic acid (5 per cent.) with which the burn has been treated, forming a coagulum rapidly.

Hoodless writes an annual report on the medical school at Suva. During 1938 there were 38 students in residence. *C. W.*

Polidori (V.). Méthodes rapides et simples de coloration des hématozoaires. [**Simple Rapid Methods of staining Blood Parasites.**]—*Rev. Méd. Française d'Extrême-Orient.* 1938. Nov. Vol. 22. No. 9. pp. 1098–1101.

The author prepares 1 per cent. solutions of eosin and methylene blue in neutral double distilled water. These are kept separately in the dark. One drop of the eosin is mixed with distilled water and to this is added, immediately before use, one drop of methylene blue. The (fixed) slide is covered with this for 5–10 minutes, washed and examined.

For quasi-vital staining, 1 in 500 eosin and 1 per cent. methylene blue are used (in separate solutions). To avoid precipitation on mixing, equal drops of each are placed on a cover slip, they are rapidly mixed with a drawn-out glass rod and the cover slip quickly inverted on to the

unfixed blood slide. Excess of stain is taken up with blotting paper. Solutions of 1 in 1,000 and 1 in 2,000 can also be used. The slides may be examined immediately ; cells and parasites are clearly coloured and Schüffner's dots show distinctly.

For thick drop preparations 4 drops of 1 per cent. eosin and 8 of 1 per cent. methylene blue are added to 20 cc. of distilled water, and the mixture is stirred with the slide carrying the thick drop. In 15 minutes it is haemolysed and stained.

In the absence of all trace of alcohol the precipitate caused by the mixture of eosin and methylene blue forms very slowly.

Alcoholic solutions can be used, consisting of :—

A	Methylene blue	0·6 gm.
	Bleu d'argent	0·4 gm.
	Methyl alcohol	50 cc.
B	Eosin	0·5 gm.
	Methyl alcohol	50 cc.

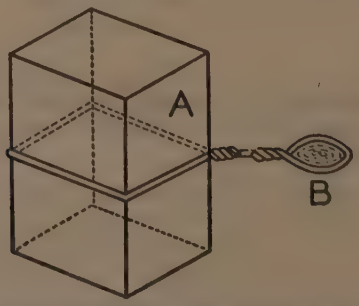
[*Bleu d'argent* is probably Borrel's blue with silver oxide.]

One drop of A and of B is mixed in 3 cc. distilled water. For staining without fixation 0·3 cc. of each is added to 3 cc. distilled water and used as described above. For thick drop preparations 7 drops of A and 7 of B are mixed in 20 cc. distilled water and the slide left immersed for 20 minutes.

These procedures are quick and simple and the stains stable even in hot countries if protected from light. *C. W.*

Williams (Carroll M.). **A Method for studying Living Mosquito Larvae and Other Small Aquatic Invertebrates.**—*Science.* 1939. July 7. N.S. Vol. 90. No. 2323. pp. 21–22. With 1 fig.

One end of a piece of thin copper wire is twisted into a circle of ½ inch diameter, the other end round a square block of lead which forms a stable support. The wire circle is dipped into water and the larva or other small aquatic animal is introduced into the film retained in the circle, which can then be placed in focus under a microscope for study. By this method there is ample air supply and no interference with the normal habits such as may occur under a cover slip or in a preparation treated with drugs. The figure explains the method.



Device for studying small, living, aquatic animals. *A*, lead block ; *B*, wire loop with inclosed film of water.

[Reproduced from *Science.*]

C. W.

Giomo (Gino). Lo stato attuale delle conoscenze sull'ulcera tropicale. [**The Present State of Knowledge of Tropical Ulcer.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1939. Sept. Vol. 20. No. 9. pp. 536–566. With 4 figs. & 1 map.

This is a long discussion of theories advanced to explain the aetiology of tropical ulcer, which are not new to readers of this *Bulletin*. The author accepts the view that vitamin deficiency plays an important part, together with the effects of warm humid climate and the debility caused by many diseases of the tropics. Spirochaetes and fusiform bacilli are concerned in the aetiology. He describes the clinical appearances, illustrating his paper with good photographs, and gives details of various treatments.

In prevention he urges improvement in nutrition, treatment of other debilitating diseases, prompt attention to trivial injuries, protection of legs and feet and the treatment of cases to prevent contagion.

C. W.

Todd (K. W.). **A Treatment for Phagedaena (Tropical Ulcer).**—*Brit. Med. Jl.* 1939. Sept. 30. pp. 687–688.

The author has used this treatment almost exclusively for a dozen years. It consists of applying a freshly prepared saturated solution of potassium permanganate on cotton-wool to the sloughing floor of the ulcer. Small sloughs seem to be burnt away and large sloughs are freed as much as possible and cut away with scissors, though a warning is given against cutting tissue which bleeds. Removal of dead skin often reveals further areas. The application is continued until the patient experiences the sensation of burning and the ulcer, which has a tarred appearance, is then filled with 1 in 5 iodoform-boric dusting powder, covered with wool and bandaged. On the third day remaining sloughing spots are similarly treated; few ulcers require a third application.

Even in anaesthetic leprosy ulcers the treatment can be used with great success, for it appears that permanganate does not kill living tissues, and its action is presumably against anaerobes. The treatment is known as PPC—potassium permanganate cautery. It was first quoted to the author from an unknown source by a non-medical colleague.

C. W.

Berger (R. M. Renato). La simpaticectomia periarteriosa nel trattamento delle ulceri tropicali. [**Arterial Sympathectomy in the Treatment of Tropical Ulcer.**]—*Ann. di Med. Nav. e Colon.* 1939. Jan.–Feb. Vol. 45. No. 1–2. pp. 31–36.

Hamburger (H. J.). **Observation on the Pathology and Therapy of the So-called Frontier Sore.**—*Indian Med. Gaz.* 1939. Mar. Vol. 74. No. 3. pp. 151–155. With 1 graph.

Frontier sore is to be regarded as a clinical entity but the aetiological agents are diverse. In 83 examined, leishmania were found in 11, *C. diphtheriae* in 3, staphylococci in 53, and streptococci in 5. The appearances of the sores are not uniform, but chronicity and resistance

to treatment are diagnostic features. Vitamin deficiency is apparently not a factor.

Treatment of cutaneous diphtheria was by means of antitoxin applied locally and injected intramuscularly. Cutaneous leishmaniasis was treated with antimony preparations. Forty-five of the remaining patients were treated by the local application of either a 5 per cent. prontosil ointment or a 6 per cent. soluseptasine ointment or 1–6 per cent. solutions of these drugs. In four no benefit was seen but in the rest healing took place quickly, often in less than 10 days though the ulcers may have existed for several months. No ill effects were observed. *C. W.*

HUGHES (William). **Staphylococcal Infections at Singapore.**—Reprinted from *Quarterly Jl. Med.* 1938. Oct. N.S. Vol. 7. No. 28. pp. 537–553. [55 refs.]

Staphylococcal lesions are much more often seen in warm than in temperate climates and certain manifestations appear to be peculiar to hot countries. Staphylococcal fever (as described by RYLE), is a disease which, from its primary lesions in the skin, tends to metastasize in the internal organs, but in all its stages has a constant tendency towards localization. *Staphylococcus aureus* is the common organism. Boils may occur alone, or be followed by internal metastatic abscesses, or the latter may be found when primary skin lesions are negligible or absent. Leucocytosis may not be present when boils occur alone, but is found with metastatic abscesses.

Scalp infections are common in Chinese children and in infants enteritis is a frequent and often fatal sequel. Although there is no direct proof, this enteritis is probably caused by the staphylococcus or its toxin. A bullous eruption due to staphylococci has been described under the name of *pyosis corletti*, a generalized infection, or *pyosis mansoni*, a localized disease of the axillae or genito-crural region.

Next to the skin, the lung is the tissue most susceptible to the staphylococcus and the characteristic lesion is a lung abscess with or without empyema. The author points out the importance of X-ray diagnosis in cases of pneumonia in which a high temperature persists after the tenth day.

Tropical pyomyositis has been recognized as a clinical entity for many years, and after summarizing the opinions of a number of authors as to the aetiology, the author supports BUXTON's conclusion that filariasis is not a factor, and considers the staphylococcus to be the infective agent. Pus formation may be delayed and lymphadenitis may not occur.

In treatment the author emphasizes that boils should not be incised. They may be aborted by the application of adhesive plaster and the best treatment for those which have opened is calamine lotion allowed to dry on the surface. This tends to limit spread. For deep suppuration surgical measures are necessary but should be postponed as long as possible so that incision into tissues before the formation of pus is avoided. There is no evidence that manganese, tin, antistaphylococcal serum or vaccine has any beneficial effect over a long series of cases. Anatoxin is largely used in France but has aroused little enthusiasm elsewhere.

There are many facts to suggest that allergy plays a part in staphylococcal disease and for this reason the author doubts the wisdom of using toxoid or antitoxin which may increase sensitivity. [See also this *Bulletin*, 1931, Vol. 28, pp. 46–49, 857, and 1933, Vol. 30, p. 808.]

C. W.

Earle (K. Vigors). **Sulphanilamide Derivatives in the Treatment of Tropical Pyomyositis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. July 28. Vol. 33. No. 2. pp. 169–172.

As it is generally agreed that the commonest causal organism of tropical pyomyositis is *Staphylococcus pyogenes aureus* the author attempted treatment of this condition in 18 patients with M. & B. 693 and obtained satisfactory results. Six illustrative cases are reported in detail, all were typical and in all cure was effected by one or two courses of the drug each consisting of 2 grams daily for 4 or 5 days. In no case was incision necessary. The examinations of the patients revealed the concomitant debilitating factors of ankylostomiasis, malaria, syphilis and avitaminosis which favour the development of the disease. Gummatous syphilitic lesions were excluded by the pathological findings and by the fact that the lesions in one case did not respond to potassium iodide. A true gumma, on the other hand, was not influenced by M. & B. 693 but was rapidly cured by potassium iodide.

[Tropical myositis and its causation has been a much debated subject for many years ; it has been ascribed also to filaria, to leptospira and various organisms, see this *Bulletin*, 1913, Vol. 2, pp. 92, 422 ; 1914, Vol. 3, pp. 281, 317 ; 1914, Vol. 4, p. 130 ; 1917, Vol. 10, p. 304 ; 1924, Vol. 21, p. 470 (when in contradistinction with Earle's statement good results were reported from the use of potassium iodide) ; 1925, Vol. 22, p. 161 ; 1929, Vol. 26, p. 589 ; 1931, Vol. 28, pp. 46–9 ; 1932, Vol. 29, p. 532 ; 1933, Vol. 30, p. 808 ; 1934, Vol. 31, p. 821 ; 1935, Vol 32, p. 524 ; 1936, Vol. 33, p. 697 ; and 1938, Vol. 35, p. 835.]

C. W.

Huard (P.) & Bertrand (Ch.). Nouvelles observations de myosites et pseudo-myosites à staphylocoques observées au Tonkin. [**Further Observations on Staphylococcal Myositis and Pseudo-myositis in Tonking.**]—*Rev. Méd. Française d'Extrême-Orient.* 1939. Jan. Vol. 24. No. 1. pp. 62–70.

The authors give details of 11 further cases as a supplement to the 95 previously recorded in a thesis by Do-Du-Anh. Deep-seated lesions may be confused with other conditions, for instance perinephritic abscess or appendicitis. Subacute forms may suppurate or heal without pus formation. For suppuration treatment by intrafocal injection of staphylococcal bacteriophage has been markedly successful either in bringing about complete cure or in reducing the inflammation so that a simple puncture with a bistoury is enough to evacuate the residual pus. Diathermy has given good results in the non-suppurative lesions, when combined with vaccines and general medical treatment. Massage and orthopaedic treatment may be necessary for the cicatricial contractions arising as sequelae of this infection. *C. W.*

KRÖBER (Friedrich). Ueber ein eigenartiges Krankheitsbild bei afrikanischen Eingeborenen am Westufer des Viktoria-Sees. Nachtrag zu meiner Arbeit im Band 37, 1933, S.484 ds. Zeitschr. [**A Peculiar Illness in African Natives on the West Shore of Victoria Nyanza.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1939. Apr. Vol. 43. No. 4. pp. 160–167. With 4 figs. [Summary appears also in *Bulletin of Hygiene.*]

Kröber refers first to a previous report in which he described a peculiar uro-genital condition often seen in the natives of the West shore of Victoria Nyanza. It affects chiefly men, in whom, starting with a urethritis, there develop abscesses in the neighbourhood of the urethra, on the scrotum, on the perineum, the gluteal region and hypogastrium, and the condition may lead to narrowing and complete displacement of the urethra; urinary fistulae may form on the parts mentioned. On the outer openings of these fistulae may develop nodules and many-bossed tumours which can reach the size of a man's head or larger. The whole genital area is often irregular, thickened and deformed. The urinary infection commonly leads to uraemia and death. The author has come to the conclusion that the condition is not due to Bilharzia, which is not endemic in his area, but either to gonococcal infection or to mixed infection following this. He gives no evidence of gonococci having been found in these cases but states that gonorrhoea is widespread in the Colony, and as evidence of maltreatment of such cases he mentions having seen a kind of straw stalk used for evacuating the bladder and to implant infusions into the urethra. Some use a long stick which they introduce into the urethra to encourage urination. Such treatment causes abscesses, and opening of these with impure instruments, probing of fistulae with thin sticks smeared with medicaments and such like unsuitable treatment lead in the author's opinion eventually to the conditions mentioned above. In women he very rarely saw early gonorrhoea but much salpingitis. This and azoospermia of men, which is often found there, are attributed to gonorrhoea. As further evidence of the wide spread of gonorrhoea he found many children with bacteriologically proven gonococcal infection of the genitals which he attributed to unhygienic habits. Gonococcal vulvo-vaginitis of children of white people and Indians is common and is attributed to infection by native nursemaids; it has been the subject of earnest conferences in Kenya. Gonococcal ophthalmia of new-born infants and small children is also relatively common. Colonists, either white or brown, often contract gonorrhoea from native women, and the author has not infrequently seen in them the formation of abscesses, strictures, fistulae and cystitis with bacterial flora similar to those in the condition first mentioned; he has not, however, seen any tumour formation in the colonists. As further evidence of the wide spread of gonorrhoea he instances one-child and total sterility. He refers to the importance of these factors to the population problem and the desirability of further investigation; in this connexion he mentions the interest for Germans in view of the possibility that the German colonies will be restored to the Reich.

As regards the possibility of the condition being due to infection with the virus of L.i., he mentions that Frei tests instituted on the recommendation of RUGE were negative in male cases with fully developed tumours, fistulae, etc., as described above, but positive in women with ulcers and fistulae on the genitals. He concludes from this

and histological evidence that the genital ulceration and rectal stricture formation in women is due to the virus of L.i., but he does not think the men's fistulae, ulcers and tumours are due to this cause. In spite of proof that women harbour L.i. virus he does not mention having seen L.i. in men. He says, however, that formerly he suspected that the condition first described might be due to L.i., but he abandoned the idea, not having seen any typical buboes.

L. W. Harrison.

Fici (Vincenzo). La broncospirochetosi del Castellani in Sicilia. Note pratiche. [**Bronchial Spirochaetosis in Sicily.**]—*Policlinico.* Sez. Med. 1939. Apr. 1. Vol. 46. No. 4. pp. 215–232. [26 refs.]

A long article of the nature of text-book description of the condition first noted by Castellani in 1905, the clinical symptoms associated therewith, the X-ray findings and the diagnosis. The author states that since 1934 he has seen forty cases of which 37 were in-patients living in Sicily; these were distributed mainly in the western part of the island, more in males but at all ages except the very young. He has not observed any familial or contact extension, and all were chronic in course. He divides them clinically into four groups: (1) Insidious onset (subdole) with vague signs and difficult to diagnose; (2) Bronchitic, with catarrhal, or purulent expectoration; (3) Pseudotuberculous; (4) Asthmatic, with emphysema as a complication in some. Very rarely was tuberculosis also present [whether he means that tuberculosis is rare in these patients or these rarely became tuberculous is not clear to the reviewer, but this is a point which can hardly be decided on a total of 40 cases seen in 5 years]. *H. H. S.*

Medulla (Candido). La broncospirochetosi del Castellani in Cirenaica. [**Bronchospirochaetosis of Castellani in Cirenaica.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1939. July. Vol. 20. No. 7. pp. 408–435. With 14 figs.

The author, after a discussion of previously reported work describes 6 cases seen in N. African natives. All had haemoptysis but sputum was negative for tubercle bacilli and tuberculin tests were also negative. X-ray examinations revealed pulmonary lesions not typical of tuberculosis, or accentuated hilar shadows. In the sputum of all were found spirochaetes, sometimes with fusiform bacilli, but no organisms of the type of amoebae, mycotic fungi or ova of Paragonimus. Syphilis was excluded by negative Wassermann, Kahn and Meinicke reactions. The spirochaetes varied in length from 6·6 to 16·5μ, and the irregular spirals varied between 2 and 5 in number.

The cases were sporadic, without apparent connexion with others, and were observed in 1935 and 1936. Five were successfully treated with intravenous or intramuscular Neoiacol (an arsenic preparation), the sixth was given tartar emetic *per os*, and bismuth injections.

C. W.

Silva-Correa (Miguel R.). Dos casos de esporotricosis en Cerro Largo. [**Two Cases of Sporotrichosis in Cerro Largo, Uruguay.**]—*Arch. Uruguayos de Med., Cirug. y Especialidades.* 1938. Dec. Vol. 13. No. 6. pp. 697–700. With 2 figs.

The two cases here described were very similar, except that one was more acute and the patient gave a more definite history. This

was a man of 28 years who stated that he had noticed a " small lump " on his left hand for 3 months ; he attributed it to the bite of an insect. All sorts of local treatment, fomentation, ointment, anti-anthrax serum, had been tried without success and the swelling broke and discharged a white, purulent-looking, viscid secretion. From this the author cultivated *Sporotrichum beurmanni*. Iodide treatment locally and internally brought about a cure in a little over a fortnight.

The other patient had suffered, with temporary improvements, for a year and showed a chronic ulcer of the right hand with a sticky whitish exudate. There were small " gummata " round the ulcer and five scars along the lymphatics, indicative of healed ulcers. In this case also the Sporothrix was grown and similar treatment resulted in cure in just under three weeks.

The author is of opinion that these cases are more common than is generally believed and that an erroneous diagnosis of syphilitic gumma, or of anthrax masks some of them, and stresses the point that in all such cases of chronic nodules or ulcer sporotrichosis should be borne in mind and examination made for the fungus. *H. H. S.*

DRUMMOND (Maurice). **A Case of Unusual Skin Disease.**—*Irish Jl. Med. Sci.* 1939. Feb. p. 85. With 2 figs. on 1 plate.

The patient was a female deaf mute aged 19 and the condition resembled ainhum. Several fingers of both hands were completely encircled by tightly constricting bands of fibrous tissue. Hyperkeratosis of the palms was present and soft wart-like formations were found over the knuckles and in front of the knees. There was hyperkeratosis of the soles but no constriction of the toes. Ulceration of one finger occurred but there was no X-ray evidence of bone absorption.

C. W.

BASSO (Redento). Investigaciones sobre dipteros Argentinos. I. Miasis. c. Frecuencia y naturaleza de las miasis en Mendoza. [**Myiasis in Mendoza, Argentine.**]—*Universidad Buenos Aires : Misión de Estudios de Patologia Regional Argentina (Jujuy). 1939. Publicación No. 41.* pp. 55–65. With 5 figs. & 3 graphs.

Between 1920 and 1935 there have been registered as attending at the city hospital, Mendoza, 197 cases of myiasis ; nine of these were re-infected the same year, twenty in some other year than that of first entry and one 14 years later. The site affected has been noted in 130 cases ; the nasal orifices were invaded in 64·5 per cent., wounds or ulcers of the leg in 10·4 ; the scalp in 8·3 ; the ear in 5·2 ; vulva in 4·7 ; anal margin in 3·1. As regards age, nearly 20 per cent. were between 30 and 40 years and 17 per cent. between 40 and 50, the majority being between 30 and 46 years ; most of them were day-labourers and field-workers whose personal hygiene leaves much to be desired, who suffer from wounds and ulcers, and many of them from ozaena and who indulge unduly in alcohol. Most are attacked in February, (26 per cent.), next in January (22 per cent.) and March (21 per cent.). Brief details are given of eleven patients, and a table shows the number

year by year, the localization of the infection, the sex, age, profession, and the time in hospital. The flies attacking were *Cochliomyia hominivorax* and *Sarcophaga barbata*. *H. H. S.*

Mazza (Salvador) & Cornejo (Andres). Investigaciones sobre dipteros Argentinos. I. Miasis. g. Consideraciones sobre miasis observadas en la provincia de Salta. [**Cases of Myiasis observed in Salta Province, Argentine.**]—*Universidad Buenos Aires: Misión de Estudios de Patología Regional Argentina (Jujuy). 1939. Publicación No. 41.* pp. 78–86. With 12 figs.

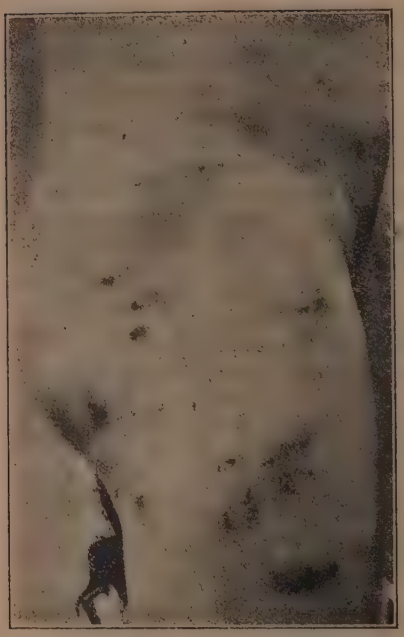
In Salta Province myiasis is not often met with; in the ten years 1928–38 inclusive only 44 have been seen in the hospital. As in the case of Mendoza Province nasal cases were the most common, 11 out of 21 in whom the localization was noted; next came the ear, the head and the ano-scrotal region. It is an affection of spring and summer almost exclusively. Of the 44 cases, eleven occurred in December, eight in January, nine in February and six in November. As regards age, 15 were between 20 and 40 years, 13 between 40 and 60, and ten were over 60 years. In nearly all the offending fly was *Cochliomyia hominivorax*. Brief details are given of nine patients; the illustrations depicting the condition of some of these are horribly realistic. *H. H. S.*

Murray (N. L.). **The Causal Organism of South African "Sandworm" Eruption. A Preliminary Note.**—*Brit. Med. Jl.* 1939. May 20. pp. 1026–1027. With 1 text fig. & 6 figs. on 1 special plate.

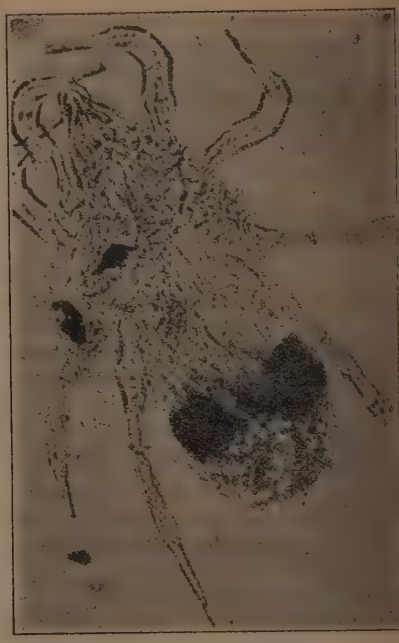
The author describes a skin disease, "creeping eruption" which he attributes to the action of an unnamed mite (Acarina).

A condition known as "creeping eruption" or "sandworm" is common in Natal and Zululand, especially on the coast. Patients exhibit a thin tortuous line of inflammation which is raised above the surface of the skin and generally occurs in those parts which come in contact with the ground. Excellent photographs show that the condition resembles the creeping eruption of other countries, due in some cases to larval nematodes, in others to larvae of Oestrid flies, of species which do not normally attack man. The author has made a careful examination of the burrows in living subjects and has excised pieces and cut sections of them. Though he has examined 30 burrows, he has failed to find either the nematodes or the Oestrid, but he has found some undetermined mites which he regards as the cause of the condition. It is stated that "A number of slides were prepared from droplets taken from various portions of the tracks in the skin . . . examination of these revealed a mite . . . ."

[Few medical men realize the great numbers and variety of mites which occur in many situations; for instance, in soil and moss, in certain growing plants and in groceries, cellars, and the premises of corn merchants. Mites may be extremely common on the skin of people who work in a variety of places, but they are minute and they pass unnoticed, except when some careful person, like the present author, has to examine a human patient very thoroughly. It appears possible that in the present cases, the mites are accidental: in favour of this view one observes that apparently 2 or 3 sorts were found, which



Case I. Adult European male affected with "sandworm." Ten days' duration. Note the tortuous track in skin over crest of ilium. Each of the other patches represents a track which has been scratched to relieve the intense irritation.



Case II. Adult female mite (unstained). Obtained from the hand.

[Reproduced from the *British Medical Journal*.]

the author regards as developmental stages of the same mite. If, however, it can be substantiated that mites cause this condition, then the observations are extremely interesting.] *P. A. Buxton.*

Scabies : Notes on a New Method of Treatment. Bwele : Inzila Impya Ya Ku Silika. 1 p. leaflet. No place or date of publication. Anonymous.

We understand that the treatment for scabies which is described in the leaflet has been in use in Northern Rhodesia for some time, and that it gives good results in the hands of unskilled personnel. The leaflet is in parallel columns, English and several African languages.

To make the solution, one puts 3 lbs. of slaked lime and 3 lbs. of sulphur in a 4 gallon petrol tin and fills it with water : this is boiled and stirred. The sediment is discarded and the clear liquid is painted on the patient with a mop, after thorough bathing and soaping. The liquid must be kept from the eyes, and should be rubbed into the skin. The patient's clothes must be washed with soap and water. The treatment is repeated daily for five days. [See also *Bull. of Hyg.*, 1939, Vol. 14, pp. 564, 813.] *P. A. Buxton.*

Ricklin (J.). Fièvres typhoïde et paratyphoïde et N'Zadi. [**Enteric Fever and N'Zadi.**]—*Ann. Soc. Belge de Méd. Trop.* 1938. Dec. 31. Vol. 18. No. 4. pp. 629–637.

In 1928 an outbreak of disease occurred among workers at Tshikapa (Belgian Congo); it was designated locally as N'Zadi. Helminthiasis is common among them and the disease was at first ascribed to this, but it is difficult to visualize an epidemic outbreak of an habitual helminthiasis. There were several fatal cases and a state of panic arose. The symptoms were: debility, fever, rapid loss of weight, diarrhoea (rarely constipation) with relaxation of sphincter and local anal ulceration. Diagnoses made were bacillary dysentery, schistosomiasis, avitaminosis. Blood examination gave agglutination of *Bact. typhosum* in some of the cases. One hundred and three admitted to hospital showed clear signs of enteric fever. The temperature rose to 39°–40°C. fairly quickly and stayed at that level for a fortnight or so, but some presented oscillations of temperature. Twenty-seven had bronchitic cough at the onset, but physical signs in the lungs were very slight. There was abdominal pain, more marked in the right iliac region, with gurgling. Vomiting was fairly common; the tongue was furred with red tip and sides. Convalescence was prolonged and sometimes a general adenitis was observed which did not clear up for 2–3 months. Rashes were occasionally seen—small spots on flanks and chest [their character is not described]. Six autopsies were carried out; four showed ulceration of Peyer's patches, two a certain degree of intestinal inflammation. The fatality rate was 11 per cent.

In the discussion it was agreed that use of the term *n'zadi* should be discouraged; it probably included several conditions. Enteric fever was certainly one, and the outbreak referred to died down after anti-enteric vaccination was adopted, but the natives apply it also to any debilitating disease with wasting. Some with tuberculosis (sputum positive) say that they are suffering from n'zadi. Whether the syndrome of diarrhoea and anal ulceration is due to an avitaminosis has not yet been determined. *H. H. S.*

Gaceta Medica de Caracas. 1939. Jan. 31. Vol. 46. No. 2. pp. 25–31.—La fiebre fria de Lara. [**Lara Fever.**] Que es la fiebre fria en Lara? [Izquierdo (Francisco)]. La verdad sobre la fiebre fria en Lara [Anzola Falcón (Tarcisio)]. La fiebre fria de Enero [González Rincones (Rafael)]. La epidemia en Barquisimeto. Ultima hora. El paludismo en Barquisimeto.

Lara fever or the febrile chills (fiebre fria) of Lara form the subject of a leading article and several communications in this issue. Among them is an account of an outbreak at Barquisimeto, Venezuela. So far as investigations have proceeded at present the condition is not separable from subtertian malaria (algid form), the parasites being found in all typical cases. *H. H. S.*

McCammon (Walter O.). **Sulfanilamide in the Treatment of Smallpox.**—*Jl. Amer. Med. Assoc.* 1939. May 13. Vol. 112. No. 19. pp. 1936–1937.

The author treated 7 patients with smallpox, 6 being members of one family, during an outbreak in Kentucky. The initial symptoms

were the same in all and with the appearance of the rash, were typical of that disease. Three were given symptomatic treatment and the disease progressed in the usual way. Four were given sulphanilamide which apparently prevented the macular eruption from becoming pustular except in one patient who developed three pustules. These patients were fit to work a week earlier than the others. The author considers that the beneficial effect of sulphanilamide was not coincidental and that it acts by aborting the second phase of pustulation and scarring. *C. W.*

Schellmann (Werner). Problems and Progress in Chemotherapy.—*Ann. Trop. Med. & Parasit.* 1939. July 20. Vol. 33. No. 2. pp. 171–195. [92 refs.]

Iriskawa (T.). Vergleichender Ueberblick ueber die Häufigkeit der in Japan und in Europa auftretenden Krankheiten. [**Comparative Survey of Diseases occurring in Japan and in Europe.**]—*Arch. f. Schiffs. u. Trop. Hyg.* 1939. June. Vol. 43. No. 6. pp. 245–256.

De (M. N.) & Tribedi (B. P.). **The Pathogenesis of the Commoner Types of Splenomegaly met with in India.**—*Indian Med. Gaz.* 1939. Jan. Vol. 74. No. 1. pp. 9–14. With 4 plates (1 coloured). [23 refs.]

The paper discusses the pathology of three types of splenomegaly which occur commonly in India—malarial, leishmanial and "Bengal splenomegaly"—and it is pointed out that the last named does not differ from the others as regards the morbid changes, which show that the same factors are at work in all three in the pathogenesis of the enlargement. In the case of Bengal splenomegaly there is this difference, namely that the infective agent is not known, though it is safe to conclude that a virus of low grade virulence is at work. A coloured plate illustrates the appearance of the cut spleen in the three conditions, while a series of microphotographs shows the main histological features. *C. M. Wenyon.*

Shah (S. R. A.). **A Note on Some Cases of Lathyrism in a Punjab Village.** *Indian Med. Gaz.* 1939. July. Vol. 74. No. 7. pp. 385–388. With 2 figs.

Indian Medical Gazette. 1939. July. Vol. 74. No. 7. pp. 421–422. **Lathyrism.** [Summary appears also in *Bulletin of Hygiene.*]

This outbreak started in June 1935, and in four months 64 out of a population of 205 had been attacked. In 34 there were early gastro-intestinal symptoms—nausea, vomiting, diarrhoea—for several days before the paretic signs appeared. In the other 30 the onset was sudden, coming on during the night. The chief nerve symptoms were tingling in the soles, analgesia, anaesthesia and formication, then the signs of spastic diplegia passing in a month or so to the paretic. Reflexes exaggerated in the early stages were diminished to absence later; sphincters were not affected. The differences from beriberi, pellagra and ergotism were easily made out.

Investigation was hampered by the fact that *Lathyrus sativus* is not grown nor used in the district attacked. It was noticed, however, that whenever the patients ate wheat *chappatis* their progress was retarded, and further enquiry discovered that these had been made

with old stocks of wheat. No such result followed the use of fresh stocks. The old stocks were then found to be contaminated with seeds of *Vicia sativa* (akta). Avitaminosis, it was thought, might play some part, but the food has been the same for years and it was only after the wheat contaminated with *Vicia sativa* seeds began to be used that these cases began to appear. *H. H. S.*

Byron (F. E.). **Fatal Results following the Administration of Magnesium Sulphate.**—*Jl. Malaya Branch Brit. Med. Assoc.* 1939. June. Vol. 3. No. 1. pp. 100–101.

Brief notes are given of five Tamil children, ages ranging between 2½ and 10 years, who died in 10 minutes to 1¼ hours after they had been given magnesium sulphate. One, aged 2½ years, had had 6 drachms of 50 per cent. magnesium sulphate in water, the others had had it in the form of *Mist. alba*, in a dose of 1¼ oz. (a child of 10 years) and ½ oz. of *Mist. alba fortis* (a child of 9 years). Intravenously administered magnesium salts are known to cause coma and death, but from the intestine absorption is slow as a rule. The above cases show that it may be rapid and, if concentrated, fatal. Normal blood serum contains 2–3 mgm. per 100 cc., but in the case of the first child mentioned above 8 mgm. were present. The dose for adults according to the B.P. is ½–1 ounce, but not infrequently three times this is given. The histories detailed show the need for caution in using this preparation for children in the doses often employed. *Mist. alba* is not, for children at least, a harmless aperient to be given in almost *ad lib.* doses. Two of the children had had a small dose of oil of chenopodium, but this played no part, as the other three had had none. *H. H. S.*

Trager (William). **Acquired Immunity to Ticks.**—*Jl. Parasitology.* 1939. Feb. Vol. 25. No. 1. pp. 57–81. With 3 plates. [35 refs.]

Animals on which ticks have fed acquire a resistance or immunity to further bites from ticks.

If one puts larvae of the tick *Dermacentor variabilis* on a guineapig not previously used, they readily gorge : if one repeats this with the same individual host, few or none succeed in gorging, though they attach themselves and start to feed. One experiment (no. 42) may be quoted out of many which are carefully recorded. One hundred larvae of this tick were put on each ear of a guineapig ; 65 and 57 gorged themselves on the two ears. Four other guineapigs were used at the same time, the percentage of larvae engorging being from 0 to 5 : these 4 hosts had this in common, that ticks had been fed on them, not necessarily very many or shortly before the experiment was made.

It is not only larval ticks that fail to feed on guineapigs used previously ; ticks of all stages may fail, or may take much less than the normal amount of blood, therefore growing less. Moreover the phenomenon is not specific to *D. variabilis*, for any one of several ticks rendered it difficult for later batches (of the same or other species) to feed fully. The immunization of the host was observed in rabbits and guineapigs, also in " deer mice " (*Peromyscus*), a natural host of this tick.

The increased resistance to the tick was partly local (*e.g.*, in one ear of the host), and partly general ; the view is put forward that an

antibody is developed which circulates, and accelerates local reaction. The resistance to tick-bite develops within 2 weeks, and may endure at least 3 months. Extract of ticks produces an immunity, local and general: some of this power of resistance to tick may be transferred to a fresh host by transfer of serum.

The paper is illustrated with microphotographs of sections of ears of animals on which ticks are fed. If the animal has not previously been attacked, the mouth-parts of the tick cut through the epidermis, and may be seen reaching the dermis: there may be a small local haemorrhage, but there is no inflammatory reaction. If, however, the host has been used before a large inflammatory mass containing polymorphs collects by the fourth day: moreover the epithelium at the edge of the bite grows down beneath this mass, which is thus isolated, so that the tick cannot reach blood-vessels and eventually drops off without completing its feed. The author reasonably supposes that it is the tick's saliva which acts as an antigen and provokes this result.

In the discussion it is pointed out that tick paralysis is apparently commoner in young than mature animals, perhaps because the young have not acquired a resistance to the bite. *P. A. Buxton.*

PHILIP (Cornelius B.). **Ticks as Vectors of Animal Diseases.**—Reprinted from *Canadian Entomologist*. 1939. Mar. pp. 55–65.

ROETTI (C.). Gli Ixodidi dello Scioa e del Gimma. [**The Ixodidae of Scioa and Gimma.**]—*Riv. di Biol. Colon.* Rome. 1939. June. Vol. 2. No. 3. pp. 185–192. With 2 figs. [19 refs.] English summary (3 lines).

ZUMPT (F.). Was wissen wir ueber die hygienische Bedeutung der Stomoxydinae? [**The Importance of Stomoxydinae in Human and Veterinary Medicine.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1939. July 10. Vol. 121. No. 6. pp. 679–731. With 5 figs. [5 pages of refs.]

This is an exhaustive review of the part played particularly by Stomoxys in the transmission of disease in man and animals. It is accompanied by an extensive bibliography. The mouth-parts of Stomoxys are described and it is pointed out that transmission of pathogenic organisms can take place only if they are present in the saliva or if the tip of the proboscis is contaminated by them. Apart from this a previous infective meal is no source of danger. Now none of the organisms affecting man, with which Stomoxys has been thought to be concerned, goes through a developmental cycle in the fly: infection is only possible through "mechanical transmission" by contamination of the proboscis. Hence any organism which circulates in the blood *may* be transmitted by Stomoxys. The likelihood of its being so will depend on the abundance of the organism in the blood, its power of survival on the exposed tip of the proboscis, and the frequency with which the fly bites man. And since man is not a preferred host for Stomoxys the chances of transmission in this way are generally small. The author concludes that they are almost non-existent in the case of sleeping sickness, very slight in dermal leishmaniasis and relapsing fever, and smaller still in Weil's disease. In the case of anthrax with its resistant spores it is more probable, and proved cases of transmission to man in this way are on record. The possibility of Stomoxys conveying typhoid and paratyphoid bacilli present in the

blood exists but infection in this way is probably of rare occurrence. Infection with streptococci and staphylococci is more frequent ; with tularaemia it is very rare because Stomoxys does not feed commonly on rodents ; and transmission of poliomyelitis, yellow fever and foot-and-mouth disease is regarded as disproved. The evidence that has been brought forward to incriminate Stomoxys in all these diseases is critically reviewed. Stomoxys is of much greater importance in veterinary medicine. *V. B. Wigglesworth.*

De la Paz (Gonzalo C.). **Our Common Houseflies, their Importance as Disease Transmitters, and their Eradication.** *Monthly Bull. Bureau of Health.* Manila. 1939. May. Vol. 19. No. 5. pp. 219–230. [24 refs.]

Tattersfield (F.). **Biological Methods of testing Insecticides. A Review.**—*Ann. Applied Biol.* 1939. May. Vol. 36. No. 2. pp. 365–384. [87 refs.]

Hull (J. B.), Dove (W. E.) & Platts (N. G.). **Experimental Diking for Control of Sand Fly and Mosquito Breeding in Florida Salt-Water Marshes.**—*Jl. Econom. Entom.* 1939. Apr. Vol. 32. No. 2. pp. 309–312.

Culicoides, which we should call midges, breed in great numbers in marshy areas along the Florida coast. They cause serious annoyance and reduce the possibility of developing the land. The authors have tried two methods of controlling them.

Methods have been developed for extracting larvae from a sample of about a quart of soil : one may also fix cages to the surface of the ground and trap the adults emerging from natural breeding places. In this way one may precisely delimit the breeding places and obtain an idea of the numbers of midges produced. In the area under study, the insects were emerging from marshy soil, which was wet with brackish water : they were confined to the moister areas near ditches : as many as 1,200 larvae can be recovered from a quart of soil.

Attempts were made to control the breeding by two methods, flooding the breeding places and draining them. Neither was cheap, for the flooding entailed the repeated pumping of water on to the land, and drainage could only be accomplished by bringing the water together into ditches and lifting it with pumps so that it ran to the sea. It seems that the second method gave the more satisfactory results. [Owing to an oversight, the authors omit to tell us the name of the species with which they were working.] *P. A. Buxton.*

Reyer (Wilhelm). Ueber die Vermehrung von *Blastocystis* in der Kultur. [**Reproduction of Blastocystis in Culture.**]—*Arch. f. Protistenk.* 1939. Vol. 92. No. 2. pp. 226–244. With 2 text figs. & 3 plates. [29 refs.]

The author has studied the structure and method of multiplication of a number of strains of Blastocystis in culture. In certain cases, pure lines grown from a single organism have been under observation. The only method of reproduction noted is division, which takes the form of fission, simple and multiple budding and the breaking up of branched forms. As no kind of fertilization was observed, it seems clear that the organism belongs to the *fungi*

imperfecti. The interesting conclusion is reached that the supposed budding of *Entamoeba histolytica* described by SCHAUDINN in 1903 was in reality budding of Blastocystis. *C. M. Wenyon.*

HEES (E.). **Epidemic Trichomonad Infections and Experimental Studies thereon.**—*Jl. Egyptian Med. Assoc.* 1938. Dec. Vol. 21. No. 12. pp. 813–837. With 22 figs., 1 diagram & 2 charts. [34 refs.]

In this paper the author makes a number of remarkable claims. He noted in Wiesbaden that human infections due to *Trichomonas vaginalis* were subject to seasonal variations and at one period occurred in veritable epidemic form at a time when the similar genital infection of cattle was exceptionally widespread in the area. The method of infection of *T. vaginalis* is discussed and certain experiments are described. The direct vaginal and cervical inoculation of *T. vaginalis* and of *T. genitalis bovis* failed to give rise to more than transitory infections. On the other hand the similar inoculation of *T. ardin delteili*, *T. hominis* and a cattle blood strain resulted in an established *T. vaginalis* infection. Furthermore, the subcutaneous inoculation of *T. genitalis bovis* produced a *T. vaginalis* infection in six females. In one case the oral administration of massive doses of culture of *T. genitalis bovis* to an inoperable case of cancer resulted in the appearance of the human intestinal trichomonads in the blood and intestine and *T. vaginalis* in the vagina. It is concluded that all the human trichomonads and those of domestic animals belong to one group, one type transforming itself into another according to circumstances. The domestic animals are to be regarded as reservoirs of the human infections, which may occur in epidemic form. It is clear that further evidence is required before the author's very revolutionary view can be accepted. *C. M. W.*

CARPANO (Matteo). Su alcune inclusioni granulari, coccoidi e bacilliformi negli eritrociti e sulla relativa natura (*Grahamella—Bartonella—Eperythrozoon, Erythrocitozoon*). [**On Certain Granular, Coccoid and Bacilliform Inclusions in the Erythrocytes and their Nature.**]—*Riv. di Parassit.* Rome. 1938. Dec. Vol. 2. No. 4. pp. 257–268. With 2 plates. [16 refs.] English summary.

The author discusses certain granules which have been described within the red blood corpuscles of mammals and birds and which have been given distinctive names such as *Grahamella*, *Bartonella*, *Eperythrozoon*, *Anaplasma*. These have all been regarded by one or other observers as parasites, but the author believes that in some cases at least the possibility of their being merely products of cell degeneration has not been excluded. *C. M. W.*

WOLF (Abner), COWEN (David) & PAIGE (Beryl). **Human Toxoplasmosis: Occurrence in Infants as an Encephalomyelitis Verification by Transmission to Animals.**—*Science.* 1939. Mar. 10. N.S. Vol. 89. No. 2306. pp. 226–227.

A child at the age of three days developed convulsive seizures, disturbances in respiration and symptoms indicative of involvement of the spinal cord. Death occurred at the age of 31 days. At post

mortem examination, limited to the nervous system, a widespread encephalomyelitis characterized by focal areas of inflammation and necrosis and disseminated miliary granulomas was found. An organism identical with toxoplasma was present in all the lesions. The infection was produced in young mice and rabbits by intracerebral inoculation and subinoculated in these animals. Guineapigs and chicks were also susceptible. It is concluded that this is the first experimentally proved case of toxoplasmosis in man, though four other cases which have been described are mentioned. The name *Toxoplasma hominis* is suggested for the parasite if it is not identical with one of the animal forms already named. *C. M. W.*

ANDREWS (Mary N.) & SHRIMPTON (E. A. G.). **Intestinal Parasites in Women and Children in Singapore.**—*Jl. Malaya Branch Brit. Med. Assoc.* 1938. Dec. Vol. 2. No. 3. pp. 136–143.

The paper records the results of examination by the smear method of 254 women and children in the St. Andrew's Hospital, Singapore, for intestinal parasites. As regards the helminths (Ascaris, Trichuris, hookworm and Clonorchis) the incidence of infections was lower than that reported by other observers, owing undoubtedly to floatation methods having been employed by them. In the case of the intestinal protozoa the usual forms were encountered but generally the incidence was lower than that reported by JEPPS who, however, was examining dysentery patients at Kuala Lumpur. In the present series there was no racial difference between Chinese and Indians while, apart from 14 infants who were entirely negative, age appeared to have little influence on the parasite rate. *C. M. W.*

VAN DEN BRANDEN (F.) & GEENS (J.). Le permanganate de potasse en solution ou l'eau vinaigrée exercent-ils une action épuratrice sur les crudités? [**The Cleansing of Raw Foodstuffs with Potassium Permanganate Solution or Vinegar.**]—*Ann. Soc. Belge de Méd. Trop.* 1938. June 30. Vol. 18. No. 2. pp. 297–298.

Potassium permanganate in 5 per cent. solution fails to sterilize lettuce steeped in it for one hour, and even 1 per cent. ruins the appearance. Probably the frequent washing in water to remove the colour after the use of permanganate is responsible for removing many of the bacteria and amoebic cysts.

The authors steeped pieces of lettuce in distilled water to which acetic acid in strengths of from 3 to 6 per cent. had been added and found that only when the strength approached that of commercial vinegar was the lettuce sterilized. Washing in water after 10 minutes in commercial vinegar preserves the appearance of the salad.

C. W.

REVIEWS AND NOTICES.

CORDOBA: **Las Actas y Trabajos del VI Congreso Nacional de Medicina, Cordoba.** [The Sixth National Medical Congress, Cordoba.] Vol. 3. 1939.

Professor Mazza and his collaborators publish papers on Chagas's disease in this volume. There are five articles on the infections found in the Reduviid vectors and in animals infected in nature and one on

the pathological anatomy of naturally infected animals. A further paper consists of a discussion of the value of the various diagnostic procedures. Twelve papers are devoted to clinical observations in which both acute and chronic cases are described, and one paper contains a record of attempts at chemotherapy. The preparation Bayer 7602 is advocated for the acute type of the disease and where parasites are abundant. Its action is markedly parasiticidal [see also this *Bulletin*, 1940, Vol. 37, p. 146]. *C. W.*

Sociedad Argentina Patología Regional. **Novena Reunión . . . . celebrada en Mendoza 1, 2, 3 y 4 de octubre de 1935. En homenaje a la memoria de Carlos Chagas. Segundo Tomo.** [The Ninth Congress of the Argentine Society of Regional Pathology.]—pp. 569–1415. With numerous illustrations. 1937. Buenos Aires: Imprenta de la Universidad.

This volume contains several papers on helminthiasis, leishmaniasis, typhus and other diseases dealt with in this *Bulletin*, but as they were presented to the Congress in 1935 and the volume was printed in 1937 but only received in 1940 it is not considered necessary now to publish detailed abstracts; many papers published since and covering similar ground have received notice in this *Bulletin*. Such as are of public health interest will be abstracted in the *Bulletin of Hygiene*. Volumes I and III were abstracted in this *Bulletin*, 1936, Vol. 33, p. 971 and 1939, Vol. 36, p. 875. *C. W.*

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Jamaica.
Kenya.
Leeward Islands.
Mauritius.
Nigeria.
Northern Rhodesia.
Palestine.
Sarawak.
Sierra Leone.
Straits Settlements.
Tanganyika Territory.
Trinidad.
Uganda.
Unfederated Malay States.
(Johore, Kelantan, Kedah and Perlis, Trengganu).
Zanzibar.

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